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WAR MACHINE

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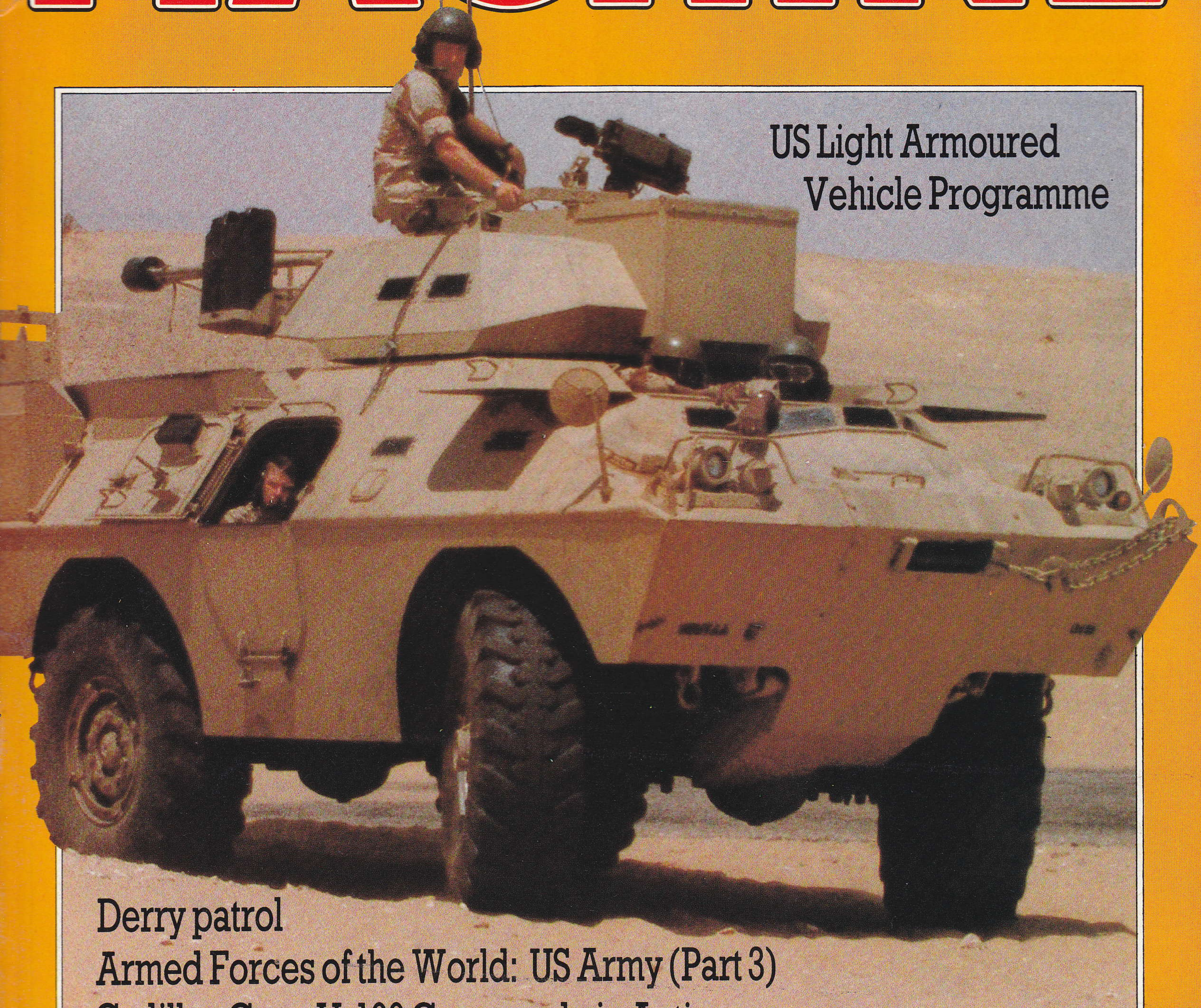

US Light Armoured Vehicle Programme

Derry patrol

Armed Forces of the World: US Army (Part 3)

Cadillac Gage V-100 Commando in Action

A fully illustrated guide to Modern Wheeled Armoured Personnel Carriers (Part 2)

WAR MACHINE

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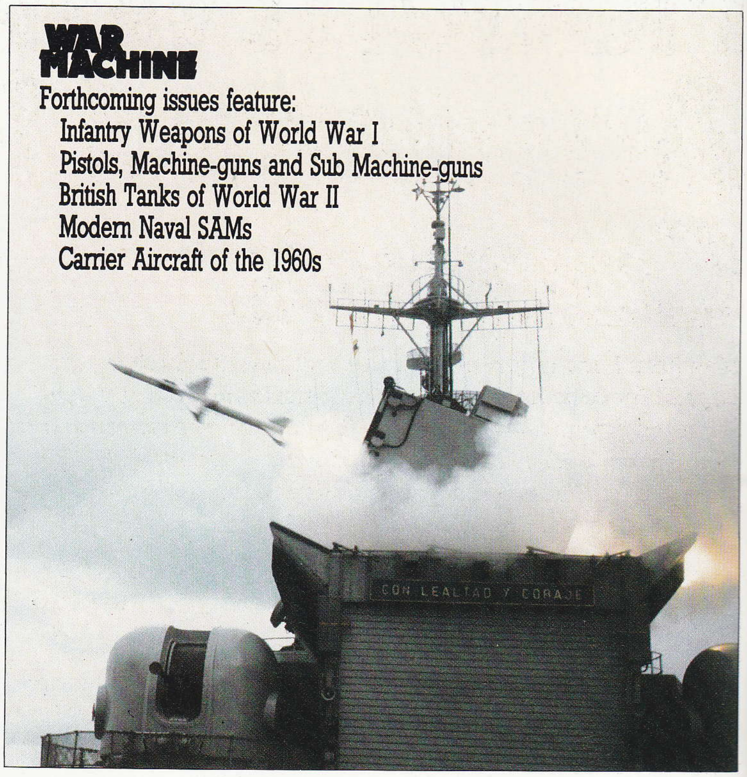

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Modern Wheeled Armoured Personnel Carriers

Part 2

Nowhere has the spread of armament manufacturing capability become more apparent than in the production of wheeled armoured vehicles. With manufacture ranging from the superpowers to the Third World, the prospective purchaser faces a bewildering choice of equipment, from the simplest to the most sophisticated.

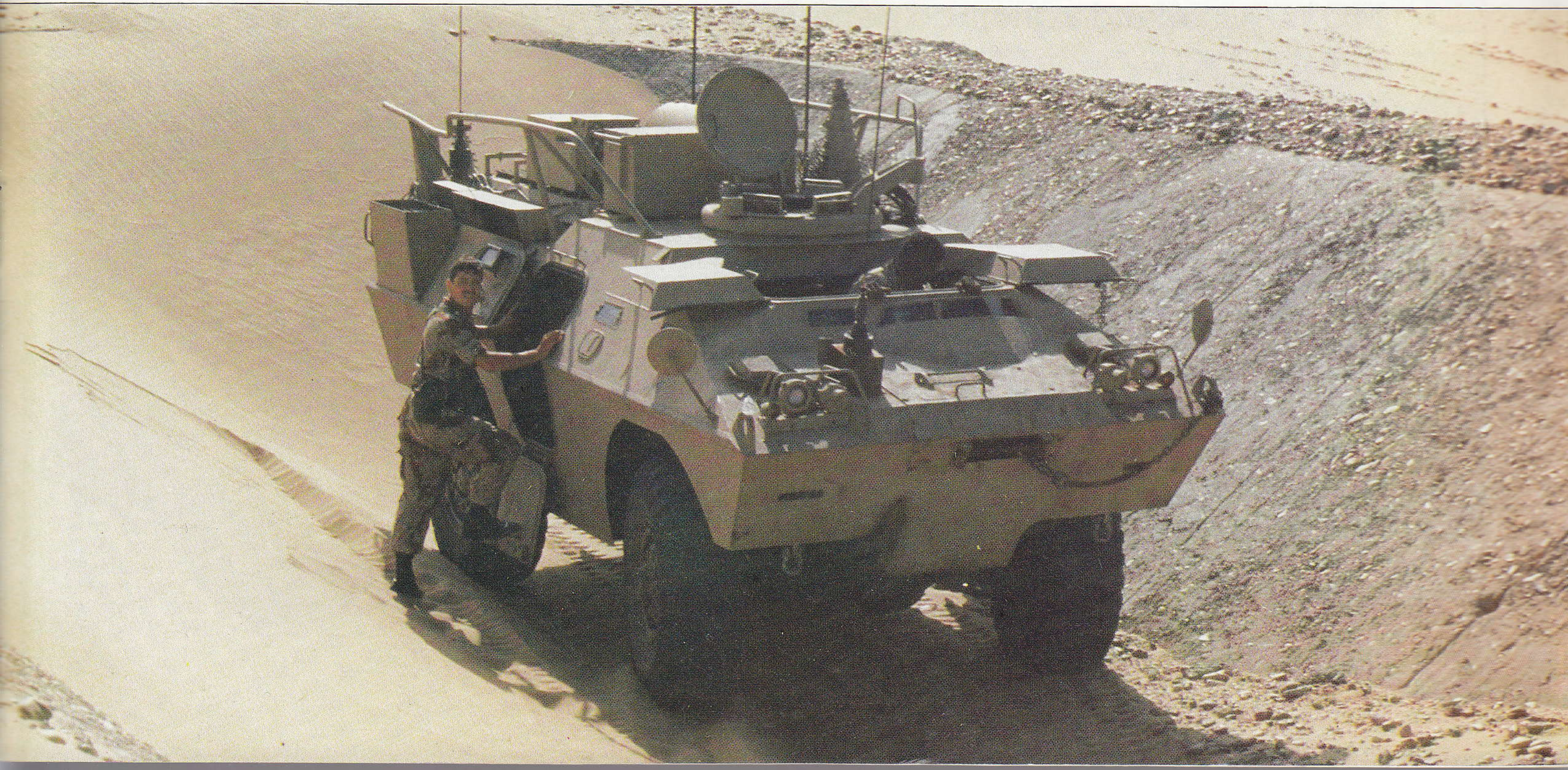
The wheeled armoured vehicle is inherently less massive than comparable tracked vehicles, and its air and helicopter portability has found it a place in the evolving military doctrine of speedy deployment and rapid intervention.

Most of the wheeled armoured personnel carriers described in the first part of this feature (for example the Soviet BTR-152, BTR-60, BTR-70, the South African Ratel and the BLR from Spain) have been developed specifically to meet the requirements of the home market, although in many cases these vehicles have been exported in substantial numbers. Most of the vehicles discussed in this second part, however, have been developed with company money as a private venture. In these cases the manufacturer detects a gap in the marketplace and designs a vehicle to meet this requirement. A typical vehicle of this type is the Belgian SIBMAS 6×6 vehicle, which can be used for a wide range of roles including that of an armoured personnel carrier. The Malaysian army had a requirement for a new armoured personnel carrier, and the many vehicles evaluated in Malaysia included the Belgian SIMBAS, West German Condor, Brazilian EE-11 Urutu, US Cadillac Gage Commando, Belgian BDX and the West German Transportpanzer 1; the tracked Scorpion was also tested. After exhaustive trials of all of these vehicles, the SIMBAS 6×6 and Condor 4×4 types were selected, plus a small number of Alvis Scorpion CVR(T) and Stormer APCs. Many countries are now holding competitions for new armoured vehicles, and these can be an expensive undertaking for the manufacturer as trials are not normally subsidized by the prospective customer.

For some years after the end of World War II, many countries were equipped with surplus armoured vehicles from the United States and United Kingdom; indeed, in 1984 there are still many countries that use the old American half-track armoured personnel carrier. In the 1950s and 1960s many countries purchased new vehicles from European or US manufacturers, and there are still several companies whose entire production is now devoted to exports. In recent years, however, a number of countries who have in the past purchased their armoured vehicles in Europe or elsewhere have established flourishing automotive industries, and many of these are now turning their attention to the design and development of various types of armoured fighting vehicles. For example, ENGESA of Brazil originally started to convert 6×4 and 4×2 vehicles into all-wheel drive configuration for civilian use. These proved so successful that the Brazilian army took an interest and the company then converted many army trucks into full 6×6 configuration. In the 1960s the USA stopped export of military equipment to many South American countries, and Brazil then decided to design its own family of 6×6 armoured vehicles which would share many common components. The result was the EE-9 Cascavel armoured car and the EE-11 Urutu armoured personnel carrier, which have been adopted not only by the Brazilian army and marines but also by many other countries all over the world, especially in the Middle East. By early 1984 ENGESA had built well over 3,000 EE-9s and EE-11s.

In the future even more countries, including Egypt, are expected to enter the wheeled armoured personnel carrier market.

The extra mobility of the wheeled APC is of considerable value to those nations with long borders to patrol. The Dragoon is typical of the new breed of private venture developments selling to smaller armed forces throughout the world.



THE NETHERLANDS

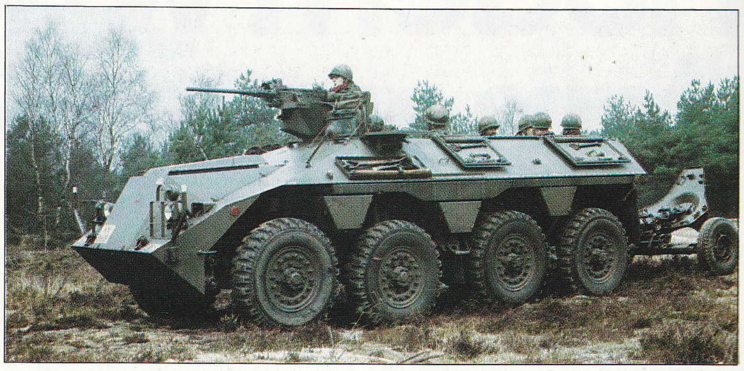
DAF YP-408 armoured personnel carrier

Since well before World War II DAF has been a major supplier of wheeled vehicles to the Royal Netherlands army, and in 1958 it built prototypes of an eight-wheeled armoured personnel carrier. With a number of modifications and the replacement of the Hercules JXLD petrol engine by a more powerful DAF diesel engine, this was accepted for service as the **DAF YP-408**, the first production vehicles being delivered in 1968 and final deliveries taking place in 1968. A total of 750 vehicles were built for the Dutch army and five are used by Surinam, these latter being passed on when the Dutch withdrew in the 1970s. In the Dutch army the YP-408 is now rapidly being replaced by the YPR-765, which is the Dutch version of the FMC Armoured Infantry Fighting Vehicle, and it is expected that all YP-408s will have been phased out of service by 1988 at the latest.

The hull of the YP-408 is of all-welded steel construction which varies in thickness from 8 mm (0.315 in) to 15 mm (0.59 in). The engine is at the front, the commander and driver are to the rear of the engine compartment, and the troop compartment is at the rear. The diesel engine is coupled to a manual gearbox with five forward and one reverse gear and a two-speed transfer box. The YP-408 has a total of eight road wheels (four on each side), but only six of these are powered, making the YP-408 an 8×6 vehicle; it is the second pair of road wheels which is unpowered. Steering is power-assisted on the front four wheels, and the tyres have reinforced side walls that enable the vehicle to be driven for a distance of 50 km (31 miles) at a reduced speed after they have been punctured. The driver is seated on the left with the commander/machine-gunner to his right. The 12.7-mm (0.5-in) M2 machine-gun can be traversed through 360° and elevated from −8° to +70°.

The 10 fully equipped troops enter and leave the YP-408 through two doors in the hull rear, and are seated five down each side facing each other. Hatches are provided over the top of the troop compartment. Standard equipment includes a heater, but the YP-408 lacks an NBC system and amphibious capability. If required, infra-red equipment can be fitted for the driver and the machine-gunner.

The basic armoured personnel carrier is called the **PWI-S(GR)**, this standing for the **Pantser Wagen Infanterie-Standaard(Groep)**; the platoon commander's vehicle is the **PWI-S(PC)**, and has a crew of nine and additional communications equipment; and the battalion or company commander's vehicle is the **PWCO**, this having a crew of six, additional communications equipment and mapboards. The ambulance model, which is unarmed, is the **PW-GWT** which can carry two stretcher patients and four seated patients plus its three-man crew (driver and two medical orderlies). The **PW-V** freight carrier can transport 1500 kg (3,307 lb) of freight. The **PW-MT** has a seven-man mortar team and tows a French 120-mm (4.72-in) Brandt mortar and 50 mortar bombs. More recent versions are the **PWRDR** radar carrier, which is fitted with the British Marconi Avionics ZB 298 ground surveillance radar, and the **PWAT** anti-tank vehicle which has the Hughes TOW ATGW system.



The YP-408MT tows a French-built Brandt 120-mm mortar, and transports the seven-man mortar team as well as up to 50 mortar bombs. The machine-gun is a Browning M2 HB 12.7-mm and is operated by the vehicle commander.

Specification
YP-408

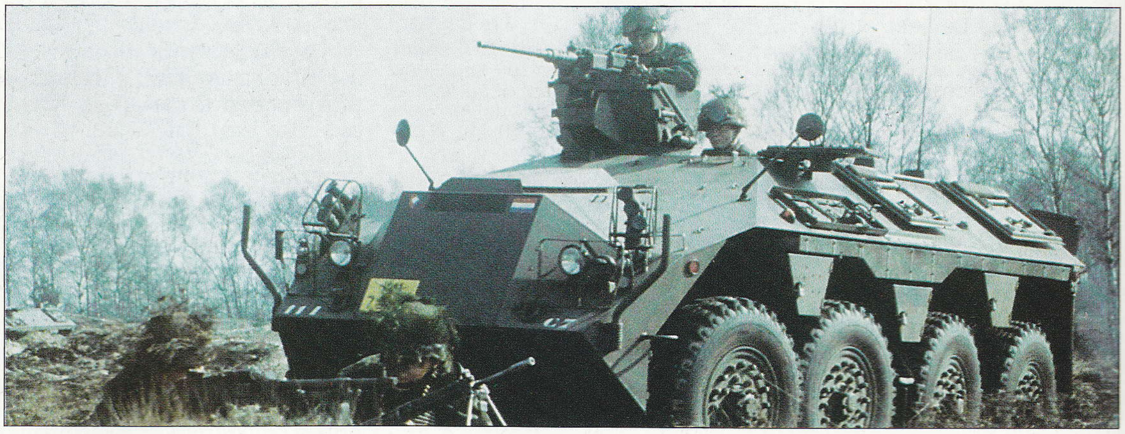
Crew: 2+10

Combat weight: 12000 kg (26,455 lb)

Powerplant: one DAF Model DS 575 6-cylinder diesel developing 165 hp (123 kW)

Dimensions: length 6.23 m (20 ft 5.3 in); width 2.40 m (7 ft 10.5 in); height (including MG) 2.37 m (7 ft 9.3 in)

Performance: maximum road speed 80 km/h (50 mph); maximum road range 500 km (311 miles); fording 1.2 m (3 ft 11 in); gradient 60 per cent; vertical obstacle 0.7 m (2 ft 4 in); trench 1.2 m (3 ft 11 in)



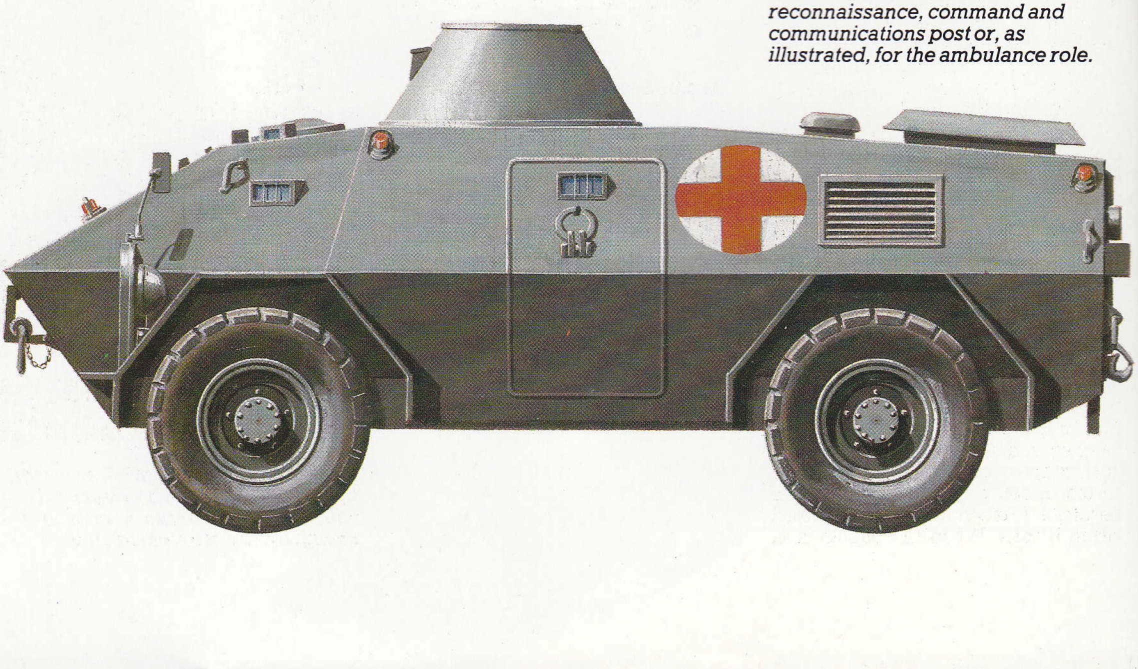
First produced in 1968, the 8×6 DAF YP-408 is soon to be replaced by the tracked FMC infantry fighting vehicle. With a crew of two, the YP-408 can transport up to 10 fully-equipped infantrymen, but has no NBC protection or amphibious capability.

SWITZERLAND

MOWAG Roland armoured personnel carrier

The **MOWAG Roland** 4×4 is the smallest vehicle currently produced by the MOWAG company of Kreuzlingen, Switzerland, and is used mainly in the internal security role. The first prototype was completed in 1963, the first production vehicles being completed the following year. Known operators of the Roland include Argentina, Bolivia, Chile, Greece, Iraq, Mexico and Peru. The hull of Roland is of all-welded steel armour construction that provides the crew with complete protection from 7.62-mm (0.3-in) small arms fire. The driver is at the front, the crew compartment in the centre and the engine at the rear on the left side; there is also an aisle in the right side of the hull that leads to a door in the hull rear. The driver has a roof hatch, and there is a single door in each side of the hull. In each of the three doors is a firing port (with a vision block above) which allows three of the embarked infantrymen to fire their rifles or sub-machine guns from within the vehicle in safety.

The basic Roland was designed from the outset for relatively easy conversion to a number of roles, including those of personnel, cargo or ammunition carrier, reconnaissance, command and communications post or, as illustrated, for the ambulance role.



MOWAG Roland APC (continued)

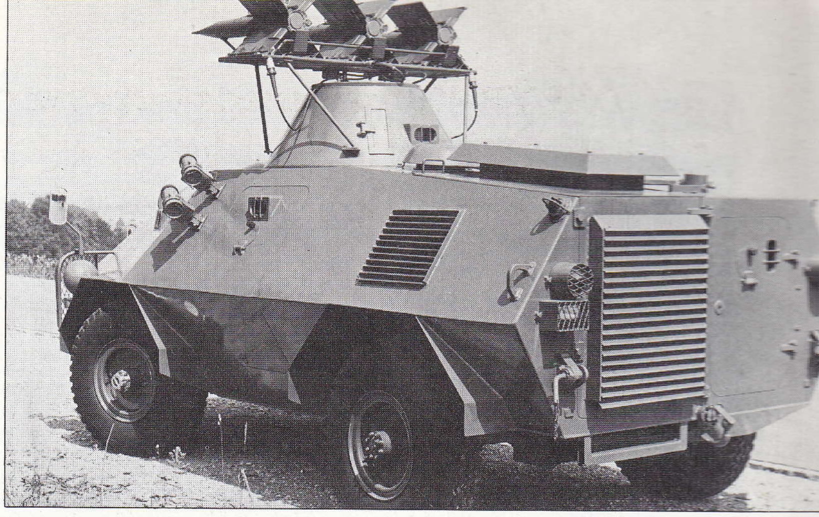
In the centre of the roof is installed the main armament; this is normally a simple cupola with an externally mounted 12.7-mm (0.5-in) or 7.62-mm (0.3-in) machine-gun. One of the alternative weapon stations is a turret on top of which is a remotely-controlled 7.62-mm (0.3-in) machine-gun fired from within the turret.

The petrol engine is coupled to a manual gearbox with four forward and one reverse gear and a two-speed transfer case. More recent production Rolands are offered with an automatic gearbox to reduce driver fatigue.

When used in the internal security role, the Roland is normally fitted with an obstacle-clearing blade at the front of the hull, a public address system, wire mesh protection for the head-lamps and sometimes the vision blocks as well, a siren and flashing lights. Another option is MOWAG bulletproof cross-country wheels. These consist of metal discs on each side of the tyre, the outside ones having ribs which assist the vehicle when crossing through mud.

In the late 1960s the company designed and built another 4×4 armoured personnel carrier called the **MOWAG Grenadier**, which can carry a total of nine men including the commander and driver. This model was sold to a number of countries but is no longer offered, having been replaced by the Piranha range of 4×4, 6×6 and 8×8 armoured vehicles. Typical armament installations for the Grenadier included a one-man turret armed with a 20-mm Hispano-Suiza cannon and a turret with twin 80-mm (3.15-in) rocket-launchers. The vehicle is fully amphibious, being propelled in the water by a propeller under the rear of the hull. Waterborne steering is accomplished by turning the steering wheel in the normal manner to move two parallel rudders mounted to the immediate rear of the propeller.

Specification
Roland
Crew: 3+3
Combat weight: 4700 kg (10,362 lb)
Powerplant: one V-8 petrol engine developing 202 hp (151 kW)
Dimensions: length 4.44 m (14 ft 6.8 in); width 2.01 m (6 ft 7 in); height (with turret) 2.03 m (6 ft 8 in)
Performance: maximum road speed 110 km/h (68 mph); maximum range 550 km (341 miles); fording 1.0 m (3 ft 3.4 in); gradient 60 per cent; vertical obstacle 0.4 m (1 ft 4 in); trench not applicable



The anti-tank Roland is armed with three Messerschmitt-Bölkow-Blohm Mamba wire-guided anti-tank missiles. The equipment is mounted directly onto the remote-controlled 7.62-mm machine-gun turret.

SWITZERLAND

MOWAG MR 8 series armoured personnel carriers

Since the end of World War II the MOWAG company has manufactured a wide range of tracked and wheeled armoured fighting vehicles aimed mainly at the export market, and has also built prototypes of armoured vehicles for foreign governments. For example, MOWAG built some of the prototypes of the West German Marder mechanized infantry combat vehicle. In the 1950s a 4×4 series of armoured vehicles were designed and built under the company designation **MOWAG MR 8**, and this was subsequently adopted by the West German border police in two configurations, the **SW1** and the **SW2**. The first batch of 20 or so vehicles was supplied direct by MOWAG, but main production was undertaken in West Germany by Henschel and Büssing. Total production in West Germany amounted to about 600 vehicles.

The SW1 (**geschützter Sonderwagen Kfz 91**) is the armoured personnel carrier model and accommodates five men plus the commander and driver, while the SW2 has a slightly different hull top and is fitted with a one-man turret armed with a 20-mm Hispano-Suiza cannon plus four smoke-dischargers mounted on each side of the turret to fire forwards.

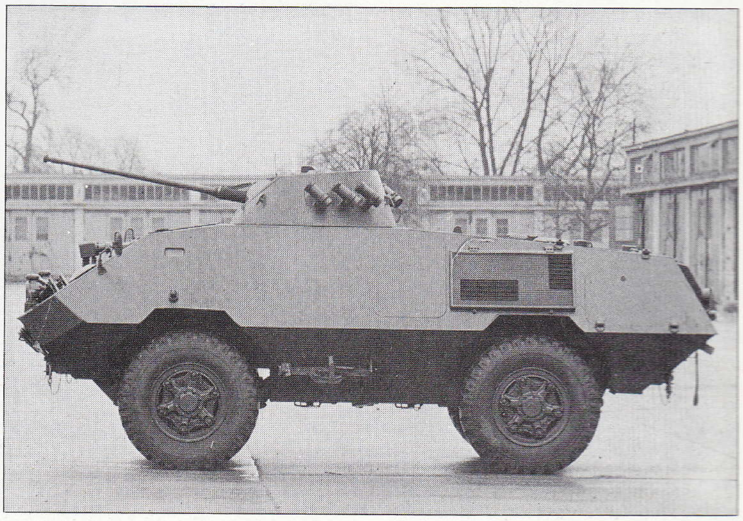
The same basic hull is used for both the SW1 and SW2, with slight differences to the roof. In the SW1 the commander and driver are seated at the front of the hull with a windscreen in front of each man; these windscreens can be quickly covered by armoured shutters with integral vision blocks. The driver also has a roof hatch above his position for driving in the head-out position. The troop compartment is at the rear of the vehicle with the engine compartment to its left. In each side of the hull is a two-part door that opens left and right; each door has a vision block and a firing port. Over the top of the troop compartment are two roof hatches and an unusual cupola. The latter is fixed but split down the middle so that it can be opened vertically if required; in each half are three fixed vision blocks. When the cupola is in the normal position complete visibility is possible through 360°.

Unlike more recent MOWAG wheeled armoured vehicles, the MR 8 series vehicles have no amphibious capability and are not fitted with an NBC system or any type of night vision equipment, although both of the latter could have been fitted if so required by the user.

MOWAG continued to develop the MR 8 series for other export markets, and these variants included the **MR 8-09** sporting a one-man turret armed with a 20-mm cannon, the **MR 8-23** that had a two-man turret armed with a 90-mm (3.54-in) gun and a 7.62-mm (0.3-in) co-axial machine-gun, and the **MR 9-32** fitted with a 120-mm (4.72-in) mortar at the rear of the hull. The last version had an open-top hull, and before the mortar could be fired it had to be lowered to the ground. Two multiple rocket-launchers were also designed and built, one with a launcher fitted with 20 145-mm (5.7-in) barrels and the other with two 80-mm (3.15-in) rocket projectors fed by an automatic loader which enabled a cyclic rate of 500 rounds per minute to be achieved. None of these models entered production.

Specification
MR 8
Crew: 2+5
Combat weight: 8200 kg (18,078 lb)
Powerplant: one Chrysler Type R 361 6-cylinder petrol engine developing 161 hp (120 kW)
Dimensions: length 5.31 m (17 ft 5 in); width 2.2 m (7 ft 3 in); height (hull) 1.88 m (6 ft 2 in)
Performance: maximum road speed 80 km/h (50 mph); maximum range 400 km (248 miles); fording 1.1 m (3 ft 7 in); gradient 60 per cent; vertical obstacle 0.4 m (1 ft 4 in); trench not applicable

West German Bundesgrenzschutz (BGS, or Federal Border Police) parade with their armoured but unarmed MR 8 (model SW1) personnel carriers. The first Swiss-built models were delivered in 1959/60, subsequently built in the Federal Republic.



The SW2 model of the MR 8, also used by the BSG, differs in being armed with an Hispano 20-mm cannon and having a crew of four instead of seven. Smoke dischargers are mounted on each side of the 20-mm turret.

SWITZERLAND

MOWAG Piranha armoured personnel carrier

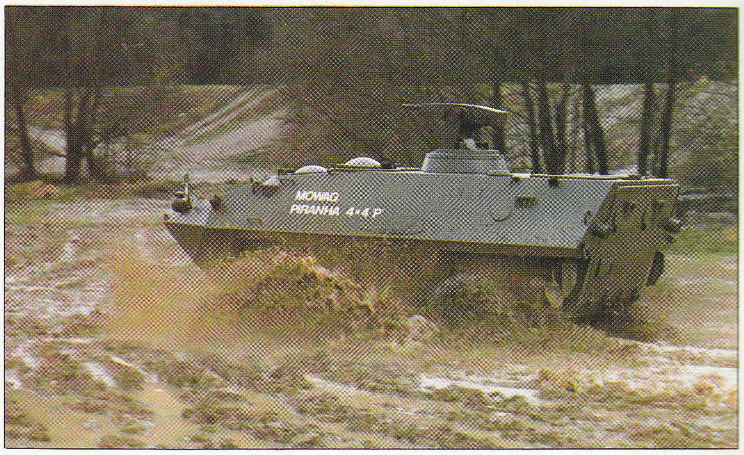
The **MOWAG Piranha** range of 4×4, 6×6 and 8×8 armoured personnel carriers was designed by MOWAG in the late 1960s, and the first prototype was completed in Switzerland in 1972, with first production vehicles following four years later. As with all recent MOWAG vehicles, the Piranha family was a private venture and developed without government support. In 1977 Canada decided to adopt the 6×6 version and production was undertaken in Canada by the Diesel Division of General Motors Canada, 491 being built for the Canadian Armed Forces between 1979 and 1982. Canada uses three versions of the 6×6 Piranha: the 76-mm (2.99-in) **Cougar Gun Wheeled Fire Support Vehicle**, which has the same two-man turret as the British Combat Vehicle Reconnaissance (Tracked) Scorpion; the **Grizzly Wheeled Armoured Personnel Carrier**, which has a one-man turret armed with a 12.7-mm (0.5-in) and a 7.62-mm (0.3-in) machine-gun and has a three-man crew consisting of commander, gunner and driver plus six fully equipped troops; and the **Husky Wheeled Maintenance and Recovery Vehicle**, which supports the other vehicles in the field. In addition to being used by Canada, the Piranha range of vehicles is used also by Chile (licence production), Ghana, Liberia, Nigeria and Sierra Leone, and in 1983 the 6×6 model was evaluated by the Swiss army as an anti-tank vehicle fitted with the Hughes TOW anti-tank system. After evaluating a number of different vehicles both tracked and wheeled, the USA selected the 8×8 version of the Piranha to meet its requirement for a Light Armored Vehicle (LAV) and the first of these was completed for the US Marine Corps in late 1983. These have a two-man power-operated turret armed with a Hughes Helicopters 25-mm cannon (as fitted to the Bradley) and a co-axial 7.62-mm (0.3-in) machine-gun. Variants required by the US Marines include a logistics support vehicle, a command vehicle, a repair vehicle, a mortar carrier and an anti-tank model. The US Army withdrew from the programme early in 1984.

The hull of the Piranha is of all-welded steel construction, which provides protection from small arms fire. On the six-wheeled version the driver is at the front on the left with the commander to his rear and the engine to the right. The troop compartment is at the rear of the hull, and entry to this is gained via two doors in the hull rear. Armament depends on the role, but can range from a single-man turret up to a two-man power-operated turret armed with a 90-mm (3.54-in) Cockerill gun. If a heavy weapon such as this is fitted, however, the commander is normally in the turret and a reduced number of troops is carried.

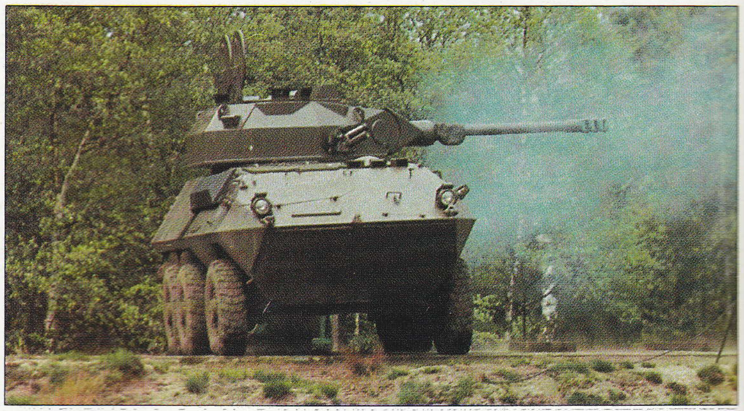
All members of the Piranha family are fully amphibious, being propelled in the water by two propellers at the rear of the hull. Optional equipment includes such things as night vision equipment, an NBC system, an air-conditioning system (essential in the Middle East) and so on.

Specification

Piranha (6×6 version without armament)
Crew: 2+12
Combat weight: 10500 kg (23,148 lb)
Powerplant: one Detroit Diesel 6V-53T developing 300 hp (224 kW)
Dimensions: length 5.97 m (19 ft 7 in); width 2.50 m (8 ft 2.4 in); height 1.85 m (6 ft 1 in)
Performance: maximum road speed 100 km/h (62 mph); maximum range 600 km (373 miles); fording amphibious; gradient 70 per cent; vertical obstacle 0.5 m (1 ft 8 in); trench not applicable



The 4×4 version of the Piranha has a maximum load of 10 infantrymen and, as here, can be armed with a remote-controlled 7.62-mm machine-gun mount. All of the Piranha family are fully amphibious, being driven by twin propellers in water.



Armed with the Belgian Cockerill 90-mm gun, the 6×6 Piranha is capable of fulfilling the infantry support role so often required of the modern infantry fighting vehicle. Such a large weapon is mounted at the expense of the number of troops carried.

USA

Verne Dragoon armoured personnel carrier

In the late 1970s the US Army Military Police issued a requirement for a vehicle which would be airportable in a Lockheed C-130 Hercules transport aircraft and be suitable for both air base protection and convoy escort. The requirement lapsed, but the Verne Corporation went ahead and with its own money built two prototypes of a vehicle which was eventually called the **Verne Dragoon**. In appearance the Dragoon is very similar to the Cadillac Gage V-100 and V-150 range of 4×4 multi-mission vehicles, but shares many common components with the M113A2 full-tracked armoured personnel carrier and the M809 6×6 5-ton truck, which are used all over the world. From the M113A2 the Dragoon uses the engine, starter, periscopes, bilge pumps, switches, electrical and hydraulic components (to name but a few), with the obvious logistical advantages.

The hull of the Dragoon is of all-welded steel construction which provides the crew with complete protection from 5.56-mm (0.22-in) and 7.62-mm (0.3-in) small arms fire and shell splinters. The driver is seated at the front on the left with another crew

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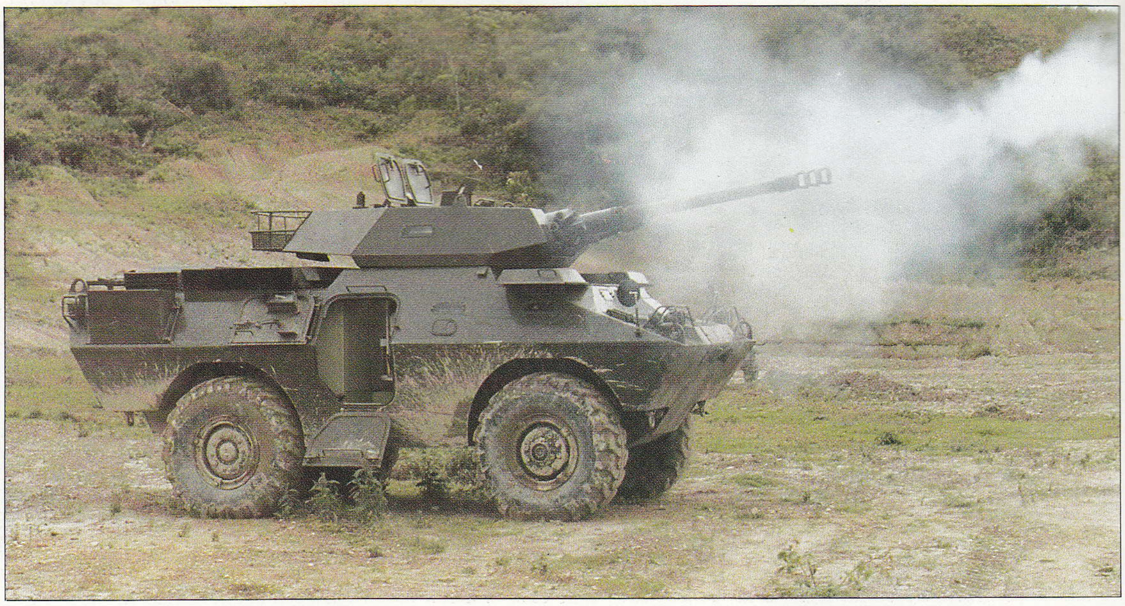


Although apparently very similar to the well established Cadillac Gage Commando range, the Dragoon is designed for maximum commonality with the existing US Army inventory. As is usual today, a variety of weapons can be fitted, including the Arrowpointe 90-mm turret with the Mk III Cockerill 90-mm gun.

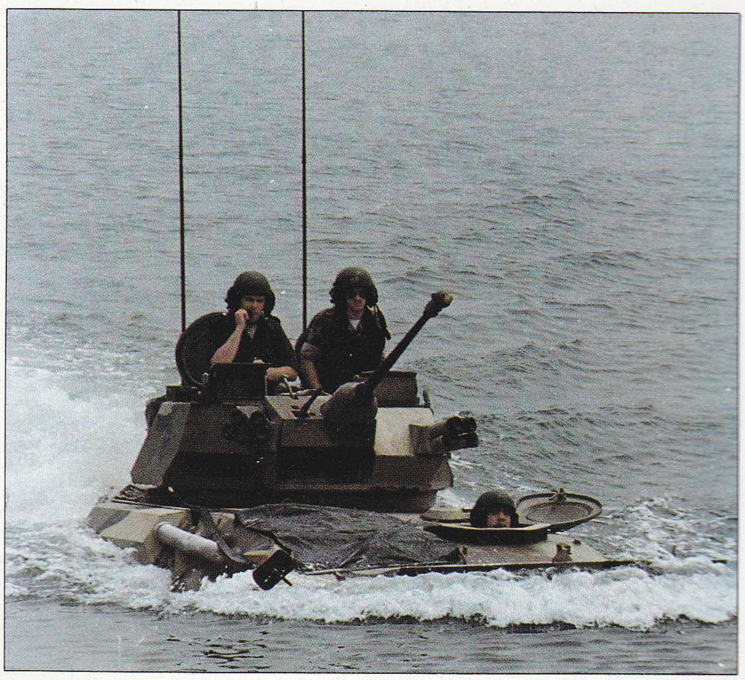
US Light Armoured Vehicle Programme

For many years the US Marine Corps has had to operate with much older equipment than the US Army, often under conditions less than suitable to army-oriented designs. The changing military doctrines of the 1980s, however, have seen major changes in procurement policy.

Recent events in the Middle East and Central America have shown the need for the United States of America to have units that can be quickly deployed by air anywhere in the world. The US Army and US Marines have many excellent armoured vehicles, but many of these are very heavy and it would take many weeks to transport a complete armoured or mechanized division from the continental USA to say Persian Gulf (for example) and by this time it could well be too late. For this reason it was decided to establish the Rapid Deployment Force (now renamed Central Command) which can quickly call on US Army, US Navy, US Air Force and US Marine Corps units. Some of these units are standard divisions with their heavy equipment, but the US Army and US Marine Corps intend to form units with much lighter equipment that could be in the Middle East within perhaps two or three days.

In 1981 the US Army and US Marine Corps issued a request for proposals to some 20 manufacturers of tracked and wheeled vehicles in the West for the required Light Armoured Vehicles, for in order to get the vehicle into service as quickly as possible it had been decided to use an existing vehicle rather than to design a new vehicle from scratch as the latter process could take anything up to 10 years. In June 1981 seven firm proposals were received, and late in that year three companies were awarded contracts to supply vehicles for testing. Alvis of the United Kingdom, teamed with Martin Marietta of the USA, built one Scorpion 90 powered by a diesel engine to meet the requirement for an assault gun vehicle and three Stormer armoured personnel carriers to meet the requirement for the light assault vehicle. The Stormers also had the diesel engine and were fitted with a two-man power-operated turret armed with a 25-mm Chain Gun as installed in the M2 Bradley Infantry Fighting Vehicle. Cadillac Gage was awarded two contracts, one for the 6×6 V-300 Commando and the other for the stretched V-150 S Commando. Three V-150 S vehicles were supplied, all with a two-man turret, one with the 90-mm (3.54-in) Cockerill Mk III gun and the other two with the 25-mm Chain Gun. Three V-300s were also supplied, one with a 90-mm (3.54-in) gun and the other two with the 25-mm cannon. General Motors of Canada suplied four 8×8 versions of the MOWAG Piranha vehicle, some fitted with the 90-mm (3.54-in) Cockerill Mk III gun and the others with a 25-mm Chain Gun, all in a two-man turret.

After tests in the USA by US Army and US Marine crews, the General Motors Canada 8×8 vehicle was selected, and late in 1982 the company was awarded a contract worth $30 million for the supply of the first 60 LAVs for the US Marine Corps, the first of these being delivered on schedule late in 1983. At that time it was stated that the five-year contract for the LAV would be worth some $477 million and cover the suply of 969 vehicles with an option on a further 598 vehicles. Early in 1984, however, the programme suffered a major setback when the US Army decided to withdraw from the whole LAV project. The US Marines remain committed to the LAV and intend to form at least three Light Armoured Assault Battalions (one each at 29 Palms, California; Camp Lejeune, North Carolina; and Camp Pendleton, California) with a single company on Okinawa in the Far East.

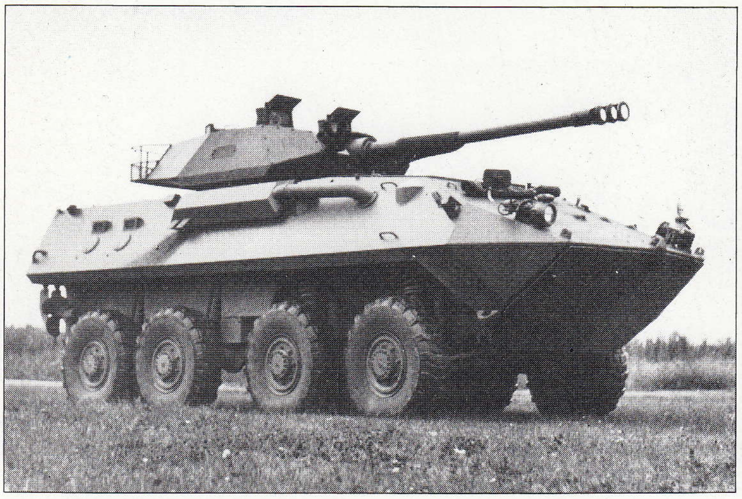


Under test at the Marine Corps Combat Center, Twenty Nine Palms, in California, the GM Canada Piranha has been selected winner of the LAV competition. The vehicle is the 8×8 model of the Swiss MOWAG Piranha built under licence in Canada.

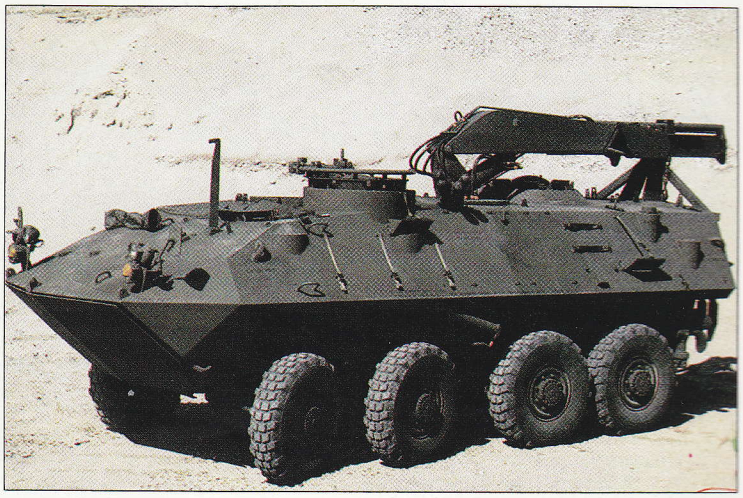
The US Marine Corps will use the LAV for a variety of roles including reconnaissance in force, attack, exploiting a breakthrough and pursuit operations.

The basic US Marine Corps version is called the LAV-25, has a three-man crew consisting of commander, gunner and driver, and can carry six fully-equipped marines who are seated in the troop compartment at the rear of the hull. The two-man power-operated turret is armed with a 25-mm Hughes Helicopters Chain Gun, 7.62-mm (0.3-in) co-axial machine-gun and a similar weapon mounted on the roof for anti-aircraft defence. Prototypes have also been built of the specialized versions including a cargo carrier with hydraulic crane for loading and unloading stores, an 81-mm mortar carrier, an anti-tank vehicle with the Hughes TOW ATGW system, a command and control vehicle with extensive communications equipment and finally a maintenance and recovery model which is essential as the vehicles will be operating a long way from their main base. At present no procurement is taking place of the 90-mm (3.54-in) assault gun model, although there is clearly a need for a fire-support vehicle of some type. There is also a requirement for an air-defence vehicle, and for trials purposes a LAV has already been fitted with a two-man turret armed with a 25-mm/30-mm Gatling gun, Stinger missiles and a surveillance radar.

The US Army is now pushing ahead with its Mobile Protected Gun System, which in many respects is a light tank, but this will not be in service for at least five years.



The 90-mm assault gun version of the Piranha has not as yet been funded, but the Cockerill Mk III armed vehicle would undoubtedly meet a requirement for an infantry fire support vehicle.



The prototype cargo carrier is fitted with a 1815-kg (4,000-lb) capacity crane, a 13600-kg (30,000-lb) capacity winch at the rear, a system for the transference of fuel, and a portable auxiliary power unit.

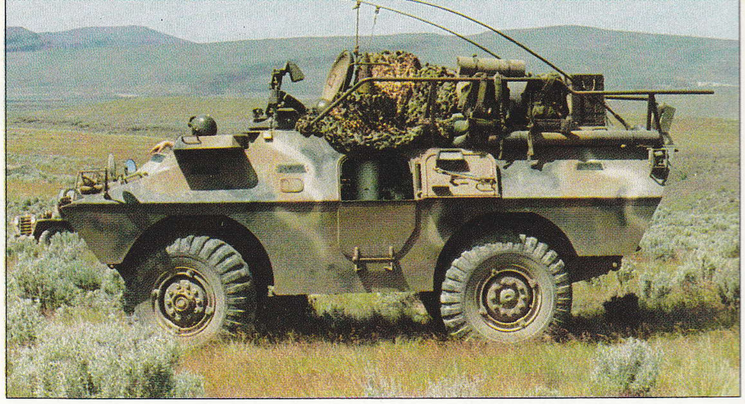
Dragoon armoured personnel carrier (continued)

member to his right, the main crew compartment is in the centre, and the engine is at the rear of the hull on the right side (on the Cadillac Gage vehicles it is on the left side), and an aisle connects the main crew compartment with the door in the hull rear. The troops normally enter and leave the vehicle via a door in each side of the hull, the lower part of each door folding down to form a step while the upper part hinges to one side. Firing ports with a vision block above are provided in the sides and rear of the crew compartment. The diesel engine is coupled to an automatic transmission with five forward and one reverse gear and a single-speed transfer case, and steering is hydraulic on the front axle. The Dragoon is fully amphibious, being propelled in the water by its wheels at a speed of 4.8 km/h (3 mph), with three bilge pumps extracting any water that seeps in through the door and hatch openings.

When being used as a basic armoured personnel carrier the Dragoon is normally fitted with an M113 type cupola with a pintle-mounted 12.7-mm (0.5-in) or 7.62-mm (0.3-in) machine-gun to allow the maximum number of troops to be carried. Other armament installations are available, however, including two-man power-operated turrets armed with a 25-mm cannon or a 90-mm (3.54-in) gun, 7.62-mm (0.3-in) co-axial and 7.62-mm (0.3-in) anti-aircraft machine-guns. More specialized versions include command, engineer, anti-tank (with TOW ATGWs), recovery and internal security vehicles.

In 1982 six Dragoons were supplied to the US Army and a smaller number to the US Navy. The former are used by the 9th Infantry Division High Technology Test Bed in two roles, electronic warfare and video optical surveillance vehicle. The first of these has extensive communications equipment and a hydraulically-operated mast which can be quickly extended for improved communications. The US Navy uses its vehicles for patrolling nuclear weapons storge areas in Alaska and the continental United States. More recently it is reported that Venezuela has placed an order for a number of Dragoons.

Specification
Dragoon
Crew: typically 3+6
Combat weight: typically 12700 kg (27,998 lb)
Powerplant: one Detroit Diesel Model 6V-53T diesel developing 300 hp (224 kW)
Dimensions: length 5.588 m (18 ft 4 in); width 2.438 m (8 ft 0 in); height (hull top) 2.133 m (7 ft 0 in) but varies with weapon fit
Performance: maximum road speed 116 km/h (72 mph); maximum road range 1045 km (650 miles); fording amphibious; gradient 60 per cent; vertical obstacle 0.99 m (3 ft 3 in); trench not applicable



The electronic warfare Dragoon is undergoing trials with the US Ninth Infantry division. Roles include the jamming of high speed communications, and advanced battlefield direction finding.

Seen on deployment to Egypt, the long-range video optical surveillance vehicle offers commanders a highly mobile, armoured observation capacity, giving real-time communication.

USA

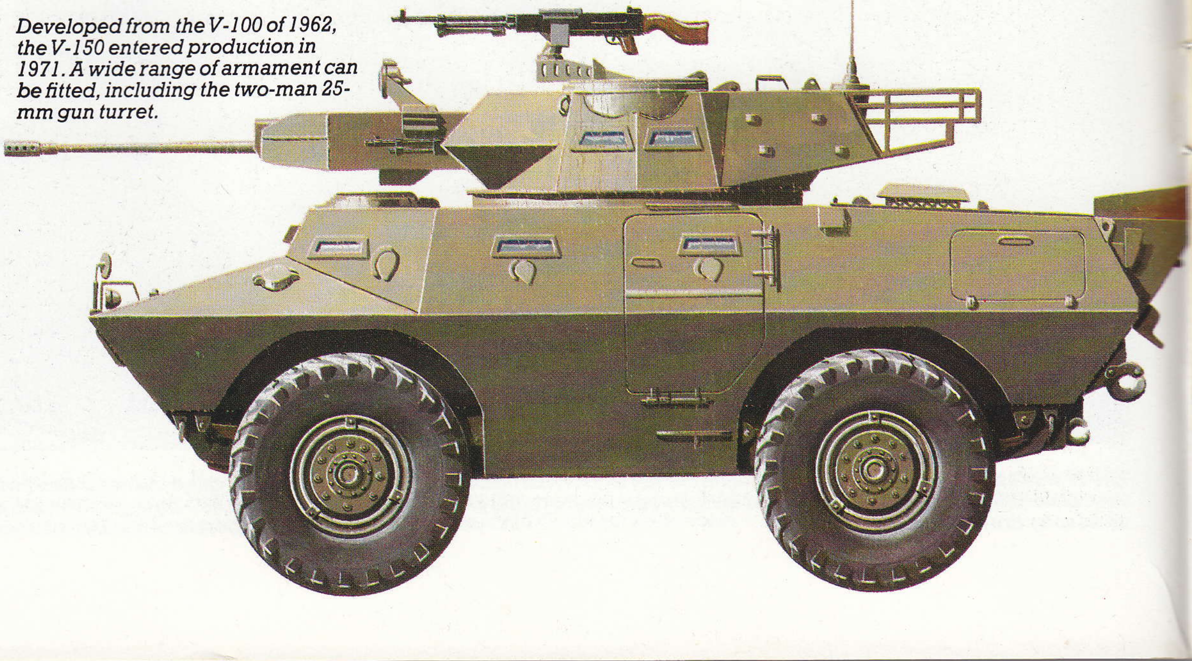
Cadillac Gage V-150 Commando armoured personnel carrier

In the early 1960s the Cadillac Gage Company of Detroit, Michigan, started to design a multi-purpose armoured vehicle which was finally unveiled in 1963 as the **Cadillac Gage V-100 Commando**. Trials were so successful that the type entered production the following year for the export market. The conflict in South Vietnam soon showed that there was an urgent need for a wheeled vehicle for patrolling air bases, fuel dumps and other high risk areas as well as escorting convoys from one base to another, and soon significant numbers of vehicles were shipped to South Vietnam for use by the South Vietnamese army and the United States forces (including the military police and US Air Force).

The first model was powered by a Chrysler petrol engine, and was followed by the much larger **V-200 Commando** with a more powerful engine, greater weight and increased load-carrying capability. The V-200 was sold only to Singapore and is no longer offered by the company. In the early 1970s the V-100 and V-200 were replaced in production by the **V-150 Commando,** which is still the current production model. The V-150 introduced a number of improvements, the most significant of which is the installation of a diesel engine which gives the vehicle a much increased range of action as well as reducing the risk of fire. So far over 4,000 V-100, V-150 and V-200 armoured vehicles have been built, and known purchasers have included Bolivia, Botswana, Cameroun, Dominican Republic, Ethiopia, Haiti, Gabon, Guatemala, Indonesia, Jamaica, Kuwait, Malaysia, Oman, Panama, Philippines, Saudi Arabia, Singapore, Somalia, Sudan, Taiwan, Thailand, Tunisia, Turkey, United States and South Vietnam. The stretched model of the V-150, the **V-150 S**, was entered in the Light Armored Vehicle (LAV) competition together with the new 6×6 Cadillac Gage V-300 Commando, but this competition was won by the Canadian 8×8 vehicle based on the Swiss Piranha.

The V-150 Commando is called a multi-mission vehicle as it can be used for a wide range of roles. In the basic armoured personnel carrier model it has a three-man crew (commander, gunner and driver) and can carry nine fully equipped troops, who enter and leave the vehicle via doors in the hull sides and rear. A very wide range of armament installations can be fitted, including a one-man turret with various combinations of 7.62-mm (0.3-in) and 12.7-mm (0.5-in) machine-guns; a two-man power-operated turret with 90-mm (3.54-in) or 76-mm (2.99-in) gun and 7.62-mm co-axial and 7.62-mm (0.3-in) anti-aircraft machine-guns; and a turret with 20-mm cannon and 7.62-mm co-axial and 7.62-mm anti-aircraft machine-guns. There is also an anti-aircraft vehicle with a 20-mm Vulcan six-barrelled anti-aircraft weapon, a mortar carrier with an 81-mm mortar, an anti-tank vehicle with the Hughes TOW anti-tank guided weapon, a command vehicle with raised roof to allow the command staff to work in the upright position, a riot control vehicle, and a recovery vehicle.

Specification
V-150 Commando
Crew: 3+9
Combat weight: 9888 kg (21,800 lb)
Powerplant: one V-8 diesel developing 202 bhp (151 kW)
Dimensions: length 5.689 m (18 ft 8 in); width 2.26 m (7 ft 5 in); height (hull top) 1.981 m (6 ft 6 in);
Performance: maximum road speed 88.5 km/h (55 mph); maximum range 643 km (400 miles); fording amphibious; gradient 60 per cent; vertical obstacle 0.609 m (2 ft 0 in)



Developed from the V-100 of 1962, the V-150 entered production in 1971. A wide range of armament can be fitted, including the two-man 25-mm gun turret.

Cadillac Gage V-100 Commando in Action

Very often the greatest threats faced by US forces in Vietnam were ambush and sabotage, and to provide the security needed both the army and air force looked to a vehicle that had not been designed for US service at all.

The V-100 Commando (4×4) multi-mission armoured vehicle was designed by the Cadillac Gage company specifically for the export market, but in the 1960s the USA became more heavily involved in the fighting in South Vietnam and Commandos were soon used by the US Army for convoy escort work, by the US Air Force for patrolling the vast airfields with their highly vulnerable aircraft, fuel dumps, weapon storage areas and so on, and by the South Vietnamese army.

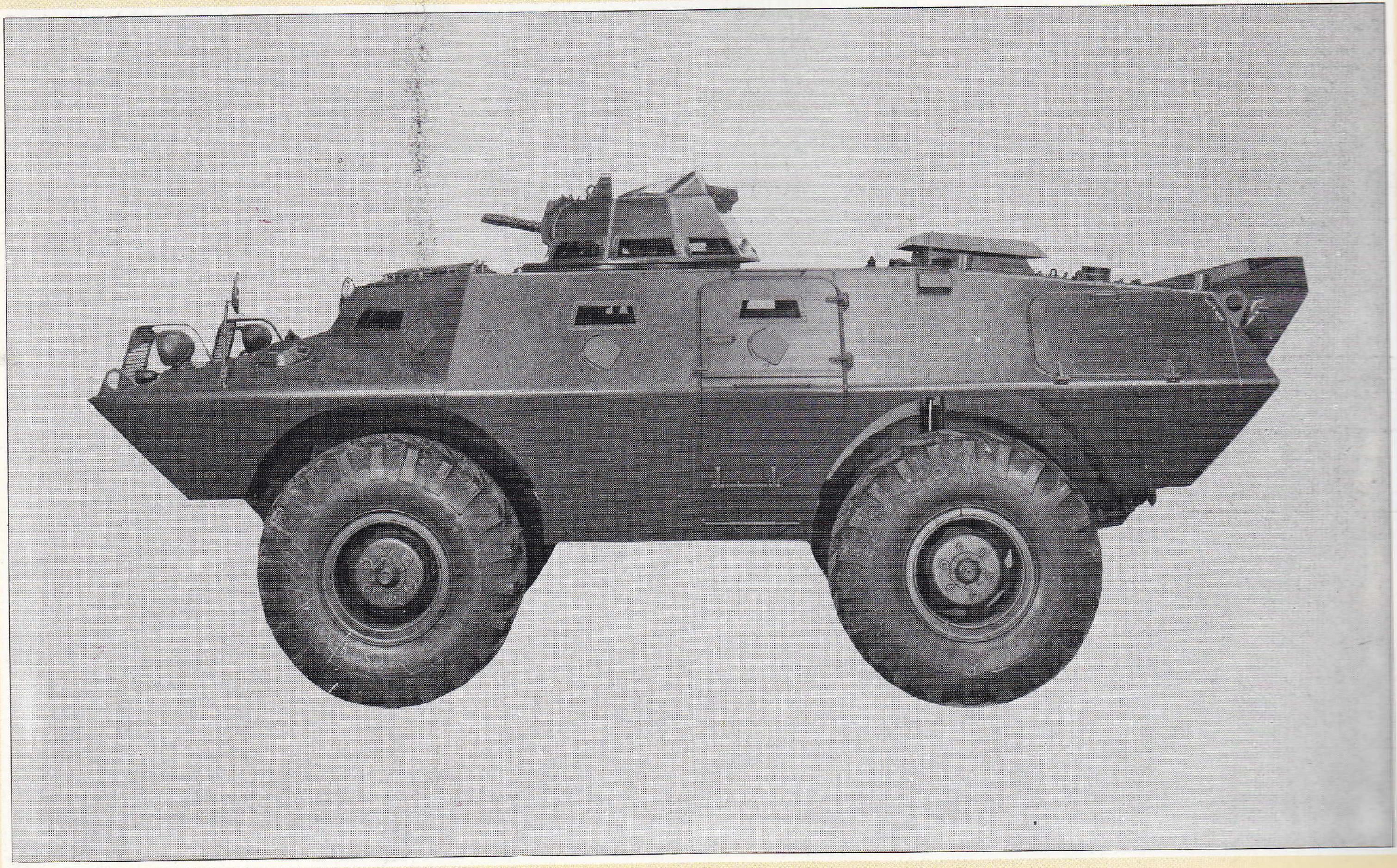
In South Vietnam there were hundreds of camps and outposts that had to be supplied with ammunition, food, water, fuel and other essential supplies. Apart from the more isolated outposts and fire support bases that were often on the tops of hills, most of these were supplied by road. As the war dragged on these valuable and essential convoys came under ever increasing attack from the Viet Cong. Some of the convoys were over 1.6 km (1 mile) long, and the Viet Cong would carefully select the best kill zone to lay their ambush. Often they mined the roads, but the Americans normally swept the roads for mines a short time before the convoy passed, and light aircraft and helicopters watched for any signs of enemy activity. The favourite trick was to hit the first and last vehicles, thereby blocking the road, and then systematically to shoot up the whole convoy prior to melting back into the dense jungle before help could arrive. The speed of the convoy was dictated by the speed of the slowest vehicle and the problem became so bad that M113 tracked armoured personnel carriers and M48A3 tanks with 90-mm (3.54-in) guns had to be taken away from offensive operations against the Viet Cong in order to escort the convoys. The 18th Military Police Brigade was then deployed to South Vietnam to undertake convoy escort and other essential roles, thereby releasing front-line battalions for their main function, hitting the enemy.

The Central Highlands of South Vietnam lay within the US 4th Infantry Division area of operations, and one of the roles of the 4th Military Police Company of this division was to escort convoys from Pleiku up to Dak To and back again, a round trip of about 225 km (140 miles), and this is what happened on a typical convoy escort run in May 1968. The drivers of the trucks and their escort gave their vehicles a final check and received their briefing, which covered everything from convoy escort procedures to the latest intelligence on the enemy. Before the convoy moved out the road ahead was swept for mines and strongpoints were established at key points. There were 157 vehicles in the convoy, the slowest being placed as usual at the head of the convoy so that the remainder would keep pace. The road was tarmac, but was pocked with many holes from previous enemy attacks and from the continual pounding of tracked and wheeled vehicles which it was never designed to handle.

Early problems

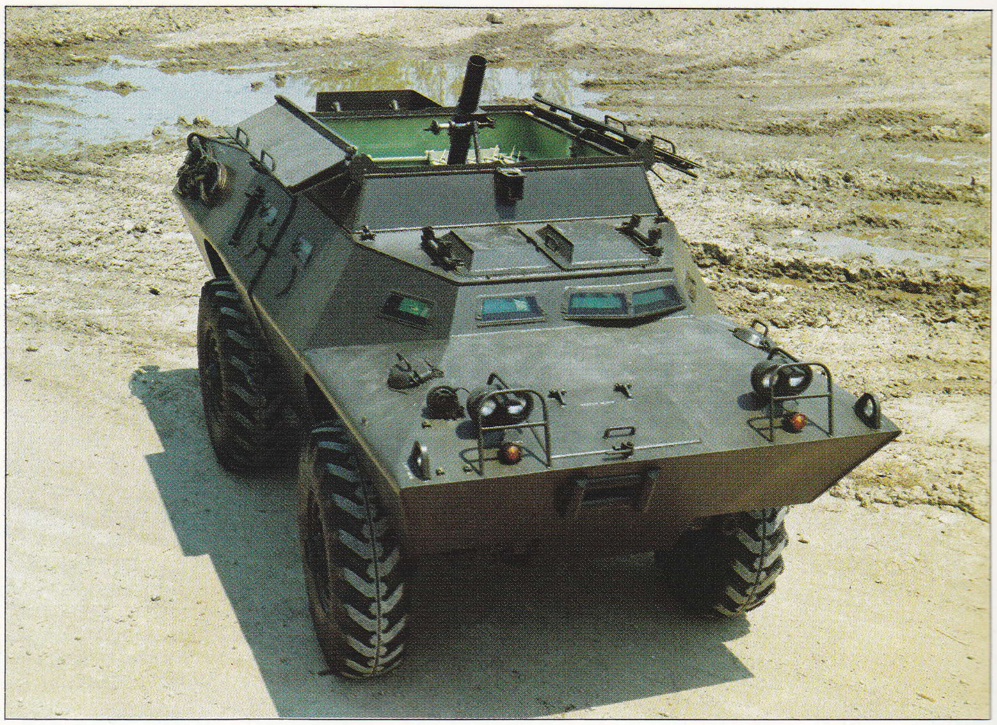
The convoy then moved out, together with its Cadillac Gage V-100 Commando armoured vehicles. As usual, things began to go wrong in the form of broken down vehicles and flat tyres; dust was an ever present problem, and soon covered men and vehicles with a fine layer. About 14 km (9 miles) south of Kontum the convoy commander, 1st Lieutenant Troy, radioed that the convoy had been ambushed. The convoy had in fact been attacked by a whole battalion of North Vietnamese troops, being raked not only by rifle and machine-gun fire but also by mortars and B-40 anti-tank rockets. The road was soon blocked with burning vehicles, and the convoy commander decided to turn the remaining trucks back while taking his V-100 Commandos into the kill zone so that they could engage the enemy with 7.62-mm (0.3-in) machine-gun fire from the one-man turrets. As soon as the convoy commander had radioed

Vietnam saw the US forces using wheeled armour on a large scale for the first time since World War II. The Cadillac-Gage Commando saw service on convoy escort and base patrols, largely in Military Police hands.



that he was being ambushed, helicopter gunships and artillery fire were directed onto the expected enemy positions. A further two V-100s manned by the Military Police then moved into the kill zone to engage the North Vietnamese. Soon M48 tanks and M113 armoured personnel carriers from the South Vietnamese 3rd Armored Cavalry arrived, attacking and overrunning the North Vietnamese position, while the artillery and tactical air support (fixed-wing and helicopters) attacked as they started to withdraw.

In addition to engaging the enemy, the V-100s went up and down the convoy rescuing trapped and injured truck drivers, ferrying them to safety and then returning once more into action. At times some of the Military Police left the safety of their vehicles to engage the enemy on foot. As in jungle, with its short engagement distances, this was the only way to ensure the defeat of the enemy. By about 14.30 the battle was essentially over and the North Vietnamese had withdrawn, leaving behind over 120 bodies. The US losses were 16 dead, including three Military Police, and many trucks, but not one V-100 Commando was lost. Once the road had been cleared of damaged and disabled vehicles the Commandos escorted the remainder of the convoy safely to their destination.



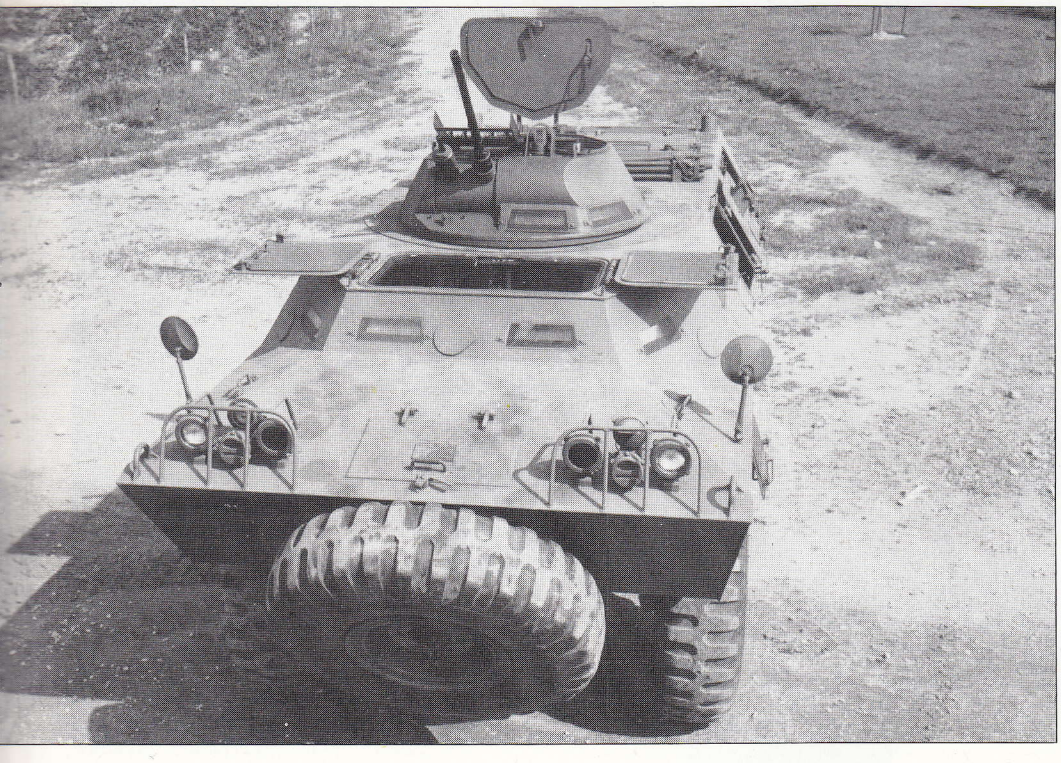
Commando has been developed through a series of models and with a variety of weapon schemes. The developed version, the V-150, has an 81-mm mortar version with the weapon mounted in the troop compartment.

Trail vehicle

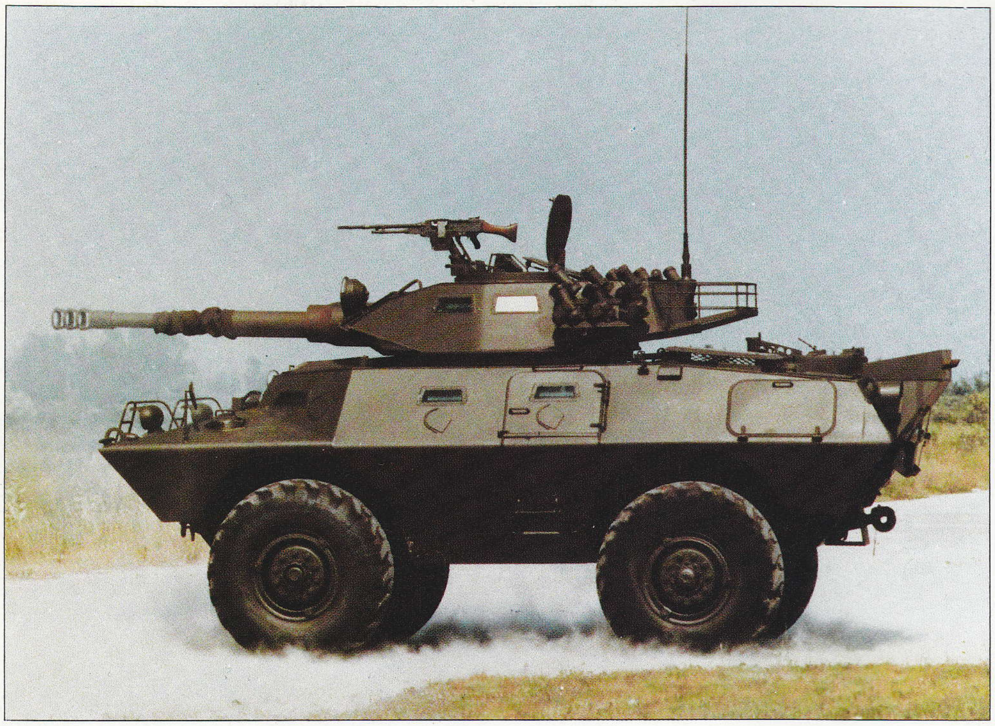
Another role of the V-100 in South Vietnam was to act as a trail vehicle. The 218th Military Police Company had to escort convoys from the major port of Cam Ranh Bay (this is still operational in 1984, but with visiting Soviet warships!) to Ban Me Thuot and back, a journey which took about two days if everything went to plan. Each convoy would have a trail V-100 manned by Military Police which would carry out four main roles; first, if a vehicle broke down the whole convoy could clearly not wait for it to be repaired so the V-100 would stay behind and cover the vehicle while it was being repaired; second, it provided rear-area protection to the convoy; third, it prevented non-convoy vehicles from intermingling with the convoy and therefore stretching the convoy out even more; and fourth, it restored movement whenever the convoy was stopped by traffic jams. The trail V-100 was normally backed up by a 2.5-ton 6×6 recovery vehicle suitably armoured and an M151 4×4 series jeep armed with machine-guns, which would also carry the trail officer.

In addition to escorting convoys, V-100s were also used in South Vietnam in place of jeeps. Once a V-100 of the 66th Military Police Company was checking the speed of trucks on a road near Cu Lam Nam. This was standard practice as there were many accidents because the trucks were driven too fast, 24 km/h (15 mph) being the normal recommended speed in towns and villages and 40 km/h (25 mph) on roads. Suddenly one of the trucks was hit by a B-40 rocket which was followed by machine-gun and rifle fire from a mixed North Vietnamese and Viet Cong ambush. Within a few minutes more V-100 Commandos of the 66th Military Police Company were on the scene, including a vehicle called *Thor* which had a three-man crew consisting of driver, gunner (who manned the twin 7.62-mm/0.3-in machine-guns) and commander. This was hit by an RPG rocket, however, and its crew were soon rescued by another V-100 called *Flash*. Another V-100, called *Lemon*, was used to rescue occupants of the burning vehicles, some of whom were wounded, while *Atom, Iron Man, Captain America* and *Spiderman* all engaged the enemy, who then withdrew. In many parts of South Vietnam the jungle was cleared back from the sides of the roads to give the vehicles in the convoy a better field of fire and to stop the Viet Cong getting too close to the roads. Many of the trucks were fitted with armoured fuel tanks and cabs, and some had the quadruple 12.7-mm (0.5-in) M55 anti-aircraft gun mounting on the rear decking to give fire support in an ambush situation. M42 twin 40-mm and M163 20-mm self-propelled anti-aircraft gun systems were also used in certain parts of the country for convoy escort duties.

In 1968 a convoy of vehicles tried to get from Long Binh to Cam Ranh Bay, but was soon



Such has been the success of the Commando that virtual copies have been manufactured in Portugal. This Chaimite V-200 is armed with a 12.7-mm M2 HB machine-gun along with a 7.62-mm weapon.



When the Commando was first built, a 90-mm gun would have been more suited to an MBT, but in the two decades since, the APC has become increasingly versatile. This Commando is armed with a Cockerill Mk III gun.

wiped out with a heavy loss of life, and for two years no attempt was made to run any more convoys along the route. In 1970, however, the situation had improved overall to such an extent that it was decided to try to run another convoy, a distance of 483 km (300 miles) with the 4th Transportation Command taking care of the trucks and the 720th Military Police Battalion (A and C Companies) taking care of the escort, which comprised three V-100s and three jeeps armed with machine-guns. The convoy started from Long Binh, which was in Military Region 3, and then crossed into Military Region 2 which had the 97th Military Police Battalion, but the original escort stayed all the way through to Cam Ranh Bay which was reached without a single shot being fired. There were the usual punctures and problems with brakes on the trucks, but no major breakdowns.

Ambush

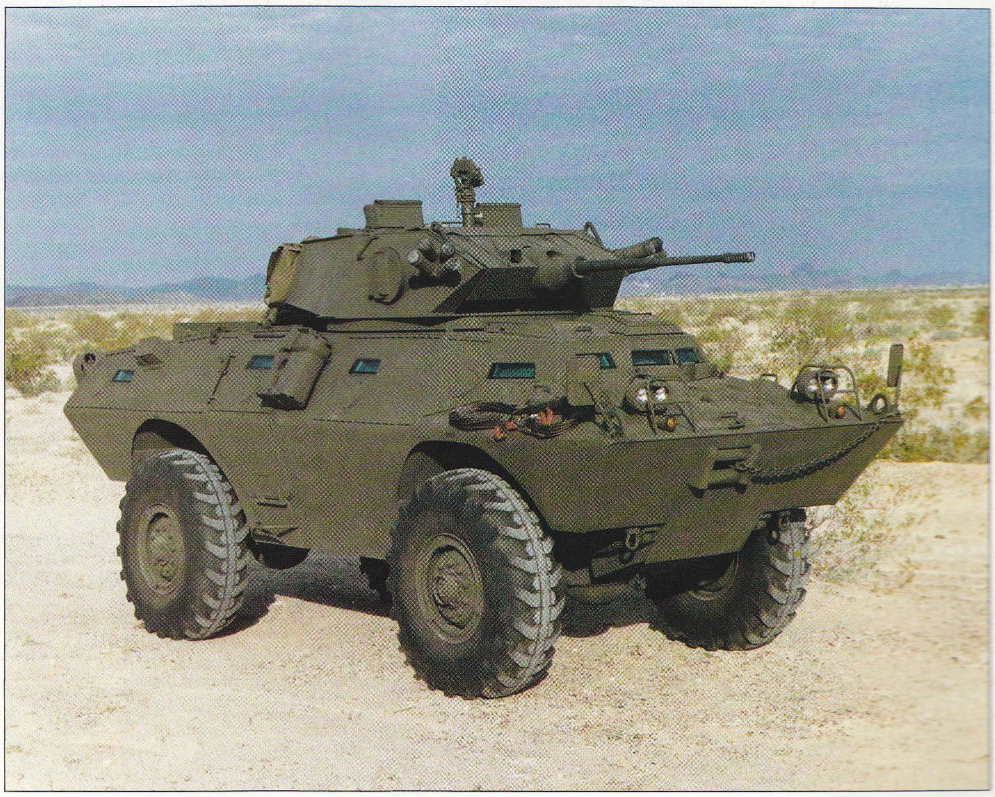
In another incident near Quan Loi, an element of C Company of the 720th Military Police Battalion was escorting a northbound convoy when an ambush was sprung by North Vietnamese regulars and Viet Cong. Instead of hitting the front and rear of the convoy, the ambushers struck the centre with concentrated rifle, machine-gun and rocket-propelled grenade fire, and one of the first vehicles to go up in flame was a petrol tanker. The convoy could not turn back, so the escort of military police concentrated on getting the remainder of the convoy through the ambush. The Commandos engaged the treeline near the ambush area with their twin 7.62-mm (0.3-in) machine-guns, which soon had the desired effect and enemy fire started to slacken, The enemy lost a confirmed six dead, and other casualties were probably taken away by the Viet Cong.

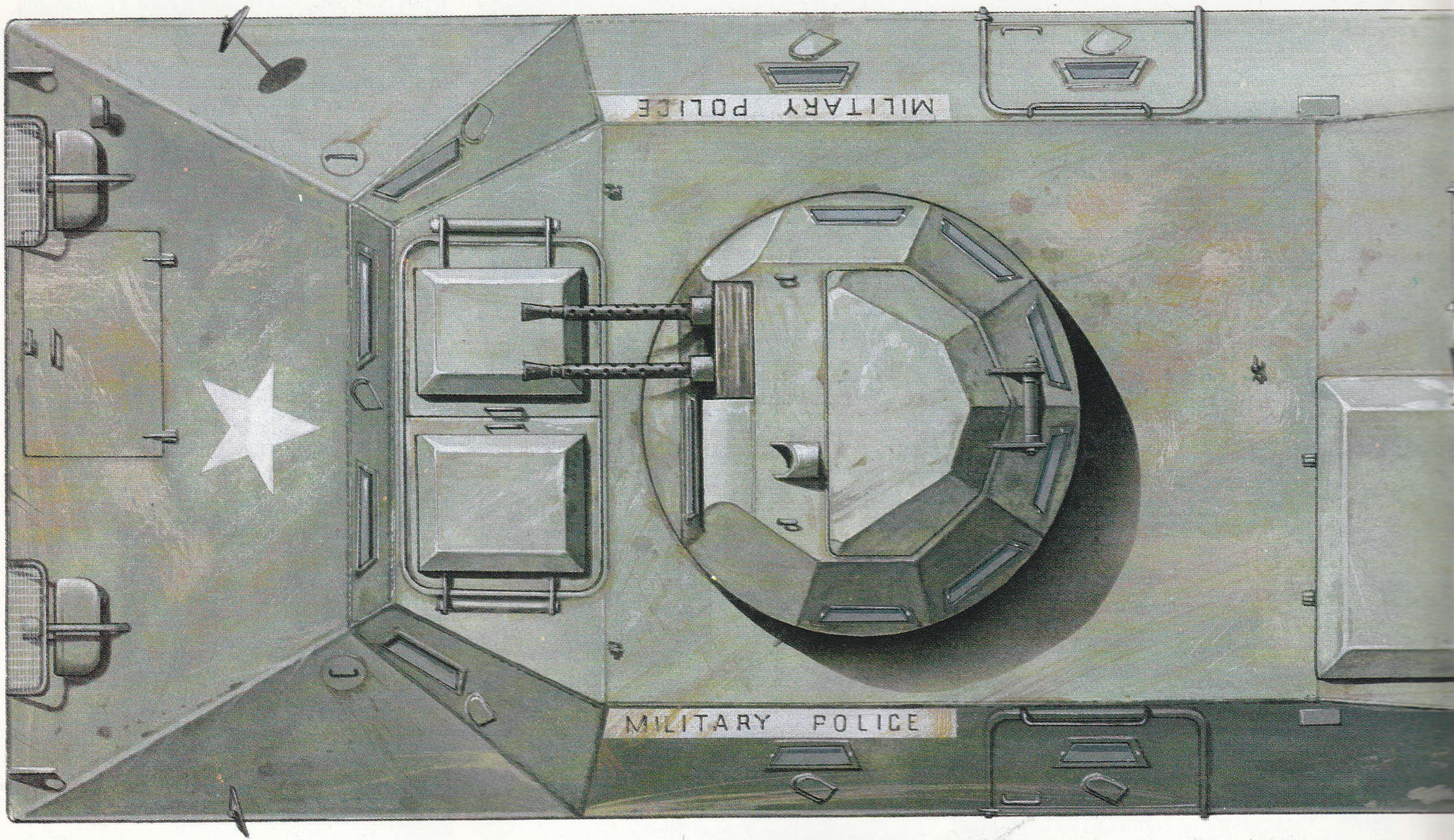
On another occasion V-100 Commando vehicles from B Company of the 504th Military Police Battalion were escorting a convoy of trucks near An Khe, but about 16 km (10 miles) from the base it was ambushed in a kill zone about 400 to 500 m (440 to 550 yards) long. The lead V-100 returned fire from its twin M73 machine-guns and made a U-turn at the front of the convoy, and then sped back down the line of trucks firing at the enemy as it went, the commander signalling to the trucks that they should increase their speed to get through the kill zone as quickly as possible. Once the convoy had passed, some of the V-100s remained behind and continued firing at the enemy positions, for while some of the enemy were using camouflaged positions others were firing while standing, and these latter made easy targets for the Commandos. The enemy then broke from cover on the north side of the road and crossed to the south; when they were half-way across the fields the helicopter gunships arrived on the scene. The V-100s continued to engage the Viet Cong, some vehicles even running out of ammunition and having to stop at nearby firebases to replenish their supplies before returning to action once again. When the battle was finally over, 43 bodies were counted, and quantities of weapons and equipment were captured, including 7.62-mm (0.3-in) AK-47 assault rifles, 10 rounds of 60-mm mortar ammunition, and anti-tank rockets and their launchers. As was standard practice, the captured weapons and ammunition were taken away and destroyed so that they could not fall into enemy hands again.

The V-100 Commando has also seen action in the Lebanon and during riot-control situations in Turkey. One of the earliest operators after the US Army was the Royal Thai army in South Vietnam. The first unit to be equipped with the V-100 was the Royal Thai Army Volunteer Force Armoured Cavalry Regiment, which received training from the US 720th Military Police Battalion.

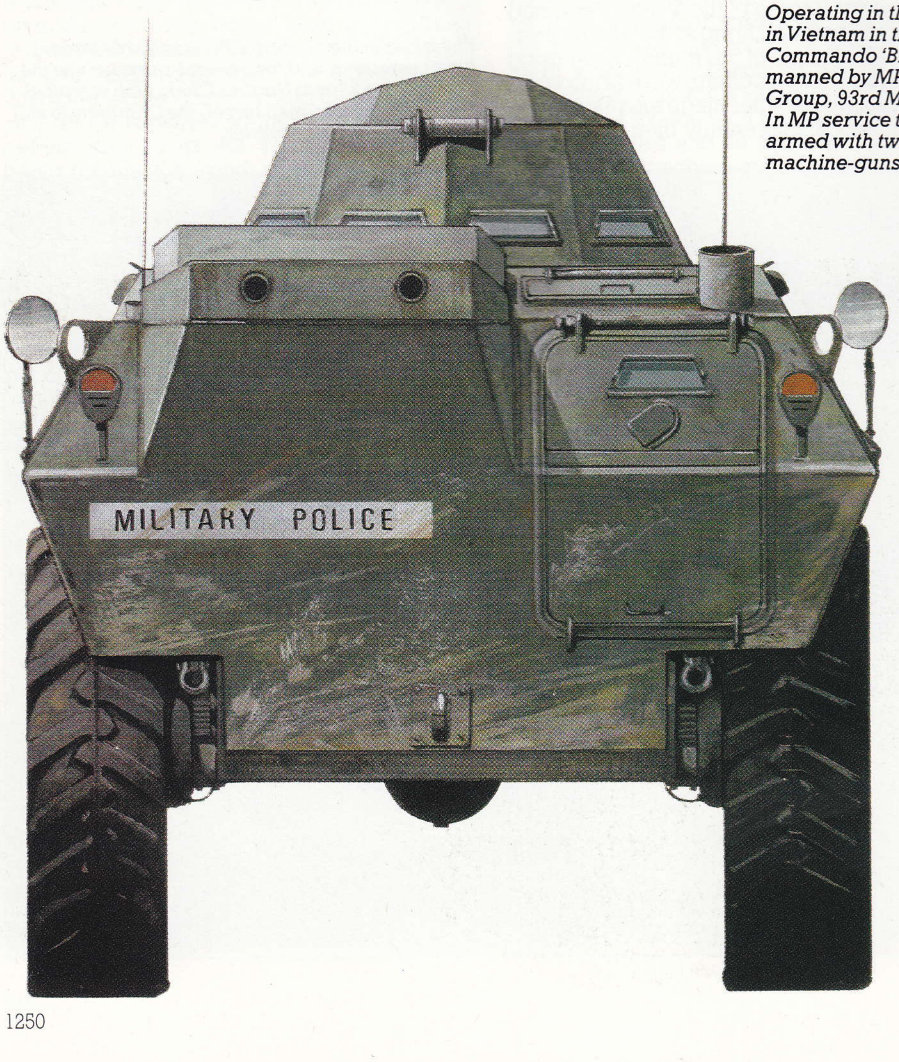
By 1984 most of the American V-100s (designated M706 by the US Army) were no longer in service, although some are used at Nellis Air Force Base in Nevada to act as Soviet vehicles in the command and control role for simulated air-defence artillery systems.

The trend in the modern APC is towards larger turret weapons, and for general-purpose use the V-150 with a 25-mm Hughes Chain Gun is typical. Even with the two-man turret, the Commando still functions as a troop carrier.




MILITARY POLICE
MILITARY POLICE

Operating in the convoy escort role in Vietnam in the late 1960s, the M706 Commando 'Blind Faith' was manned by MPs of the 16th MP Group, 93rd Military Police Battalion. In MP service the Commando was armed with twin M 73 7.62-mm tank machine-guns in a one-man turret.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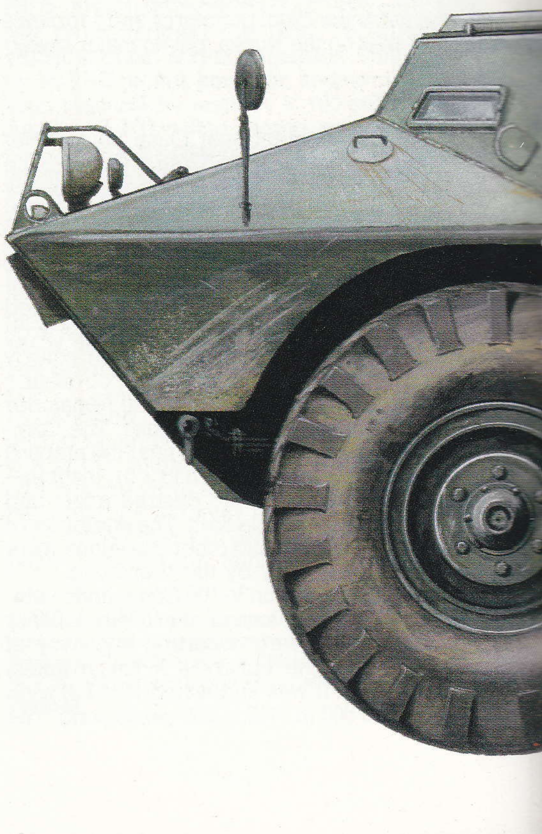

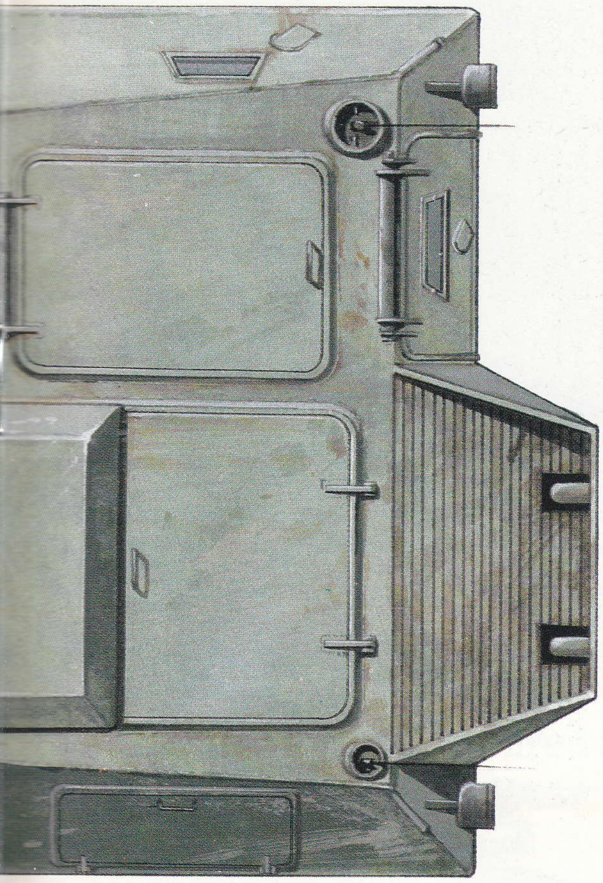

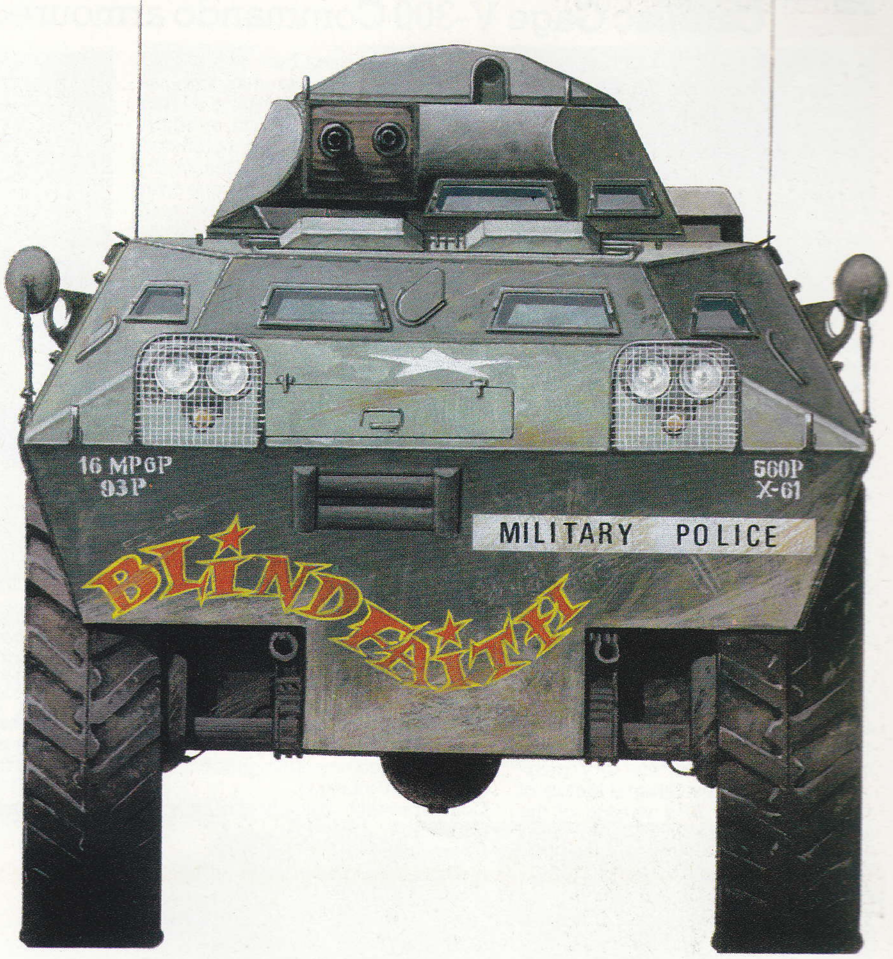
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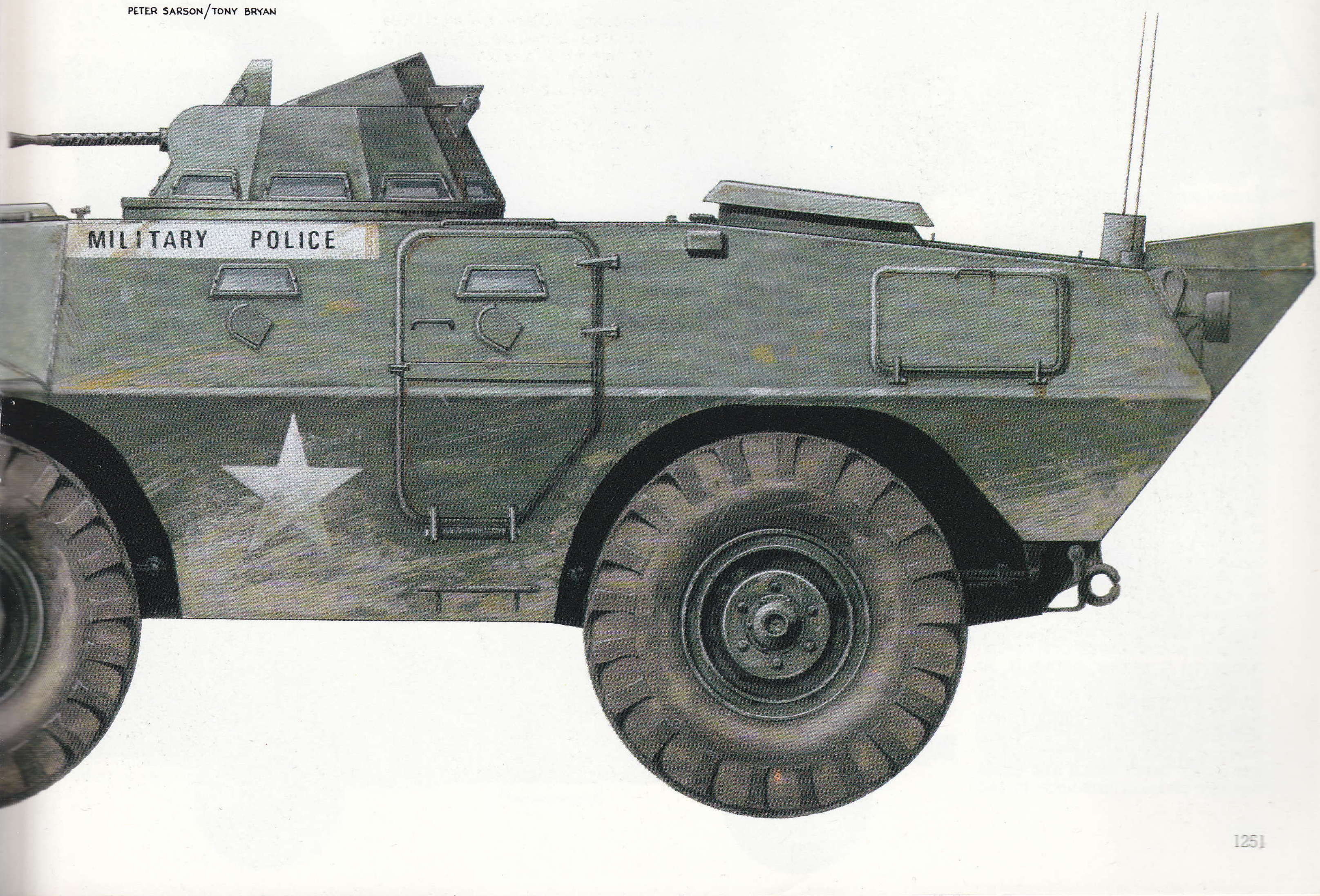
BLINDFAITH

PETER SARSON/TONY BRYAN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USA

Cadillac Gage V-300 Commando armoured personnel carrier

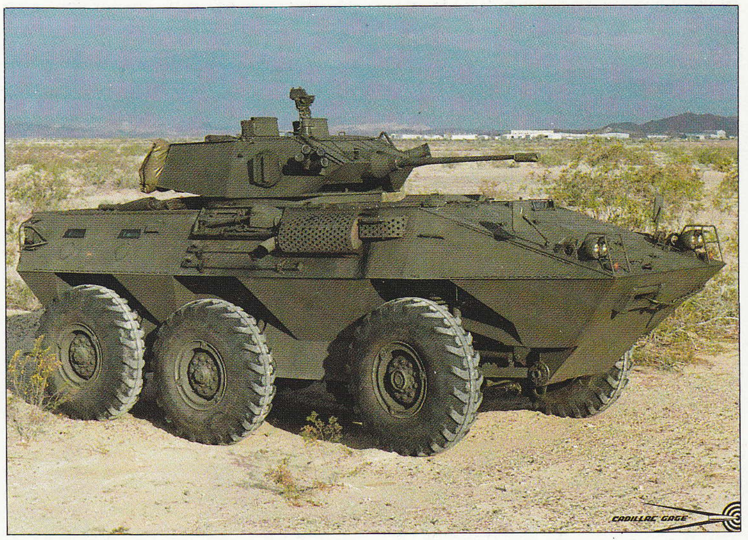
In the last 20 years the Cadillac Gage Company of Detroit, Michigan has built some 4,000 of its Commando range of 4×4 multi-mission vehicles in three models: the V-100, V-150 (current production model) and V-200. In recent years, however, there has been a trend to 6×6 vehicles with their increased load-carrying capabilities, and for this reason in 1979 the company as a private venture built two prototypes of the **Cadillac Gage Commando V-300** 6×6 vehicle which can be used for a wide range of roles, including use as an armoured personnel carrier. In 1982 Panama placed an order for 12 V-300 vehicles, which were all delivered the following year. Four different models were selected by Panama: a fire-support vehicle with 90-mm (3.54-in) Cockerill gun, a recovery vehicle, and two types fitted with different machine-gun installations. Cadillac Gage also supplied three V-300s for the US Army and US Marine Corps Light Armoured Vehicle (LAV) competition; of these one was fitted with a two-man turret armed with a 90-mm (3.54-in) Cockerill Mk III gun, while the other two were fitted with a two-man turret armed with the Hughes Helicopters 25-mm Chain Gun as installed in the FMC M2 and M3 tracked vehicles. In the end, however, the LAV programme was won by General Motors of Canada with an 8×8 version of the MOWAG Piranha.

The layout of the V-300 is quite different from that of the V-150. The driver is seated at the front left with the engine to his right. The engine is coupled to a fully automatic Allison MT-643 transmission with four forward and one reverse gear and a two-speed transfer case. In addition to his roof hatch the driver also has a small hatch in the left side of the hull. The troop compartment is at the rear, and the troops enter and leave via the two doors in the hull rear; in addition there are hatches in the roof and firing ports with a vision block in the sides and rear.

The V-300 can be fitted with a wide range of armament installations, all in a turret designed and built by Cadillac Gage. Among the two-man installations is a turret armed with a 90-mm (3.54-in) Cockerill Mk III gun, or British ROF 76-mm (2.99-in) gun or 25-mm Hughes Helicopters Chain Gun, or 20-mm cannon; there is also a one-man turret with a 20-mm cannon, and in all of these a 7.62-mm (0.3-in) machine-gun is mounted co-axial with the main armament and a similar weapon can usually be mounted on the roof for anti-aircraft defence. The one-man turret can have single or twin 7.62-mm (0.3-in) machine-guns or a combination of 7.62-mm (0.3-in) and 12.7-mm (0.5-in) machine-guns. A simple alternative to the turrets is a ring mounting with a 7.62-mm (0.3-in) or 12.7-mm (0.5-in) machine-gun.

Variants of the V-300 include an ambulance with a higher roof, an anti-tank vehicle fitted with the same TOW launcher as fitted to the M901 Improved TOW Vehicle (ITV), and an 81-mm mortar carrier.

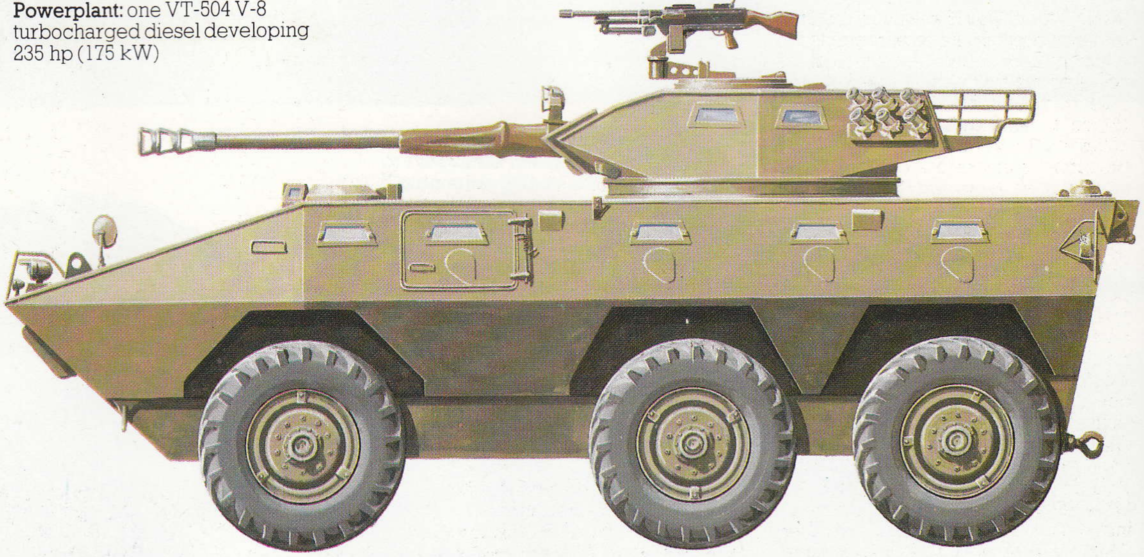
The vehicle is fitted with a front-mounted winch and is fully amphibious, being propelled in the water by its wheels at a speed of 5 km/h (3 mph).



The Hughes Helicopter 25-mm Chain Gun has been fitted to the V-300 Commando. The two-man turret has a co-axial 7.62-mm machine-gun, and smoke dischargers have been mounted on the side. An extra machine-gun can be fitted on top of the turret.

Specification
V-300 Commando

Crew: 3+9 (commander, gunner, driver and 9 infantry)
Combat weight: typically 13137 kg (28,962 lb)
Powerplant: one VT-504 V-8 turbocharged diesel developing 235 hp (175 kW)
Dimensions: length 6.40 m (21 ft 0 in); width 2.54 m (8 ft 4 in); height (hull top) 1.981 m (6 ft 6 in) but varies with weapon fit
Performance: maximum road speed 93 km/h (58 mph); maximum road range 700 km (435 miles); fording amphibious; gradient 60 per cent; vertical obstacle 0.609 m (2 ft 0 in); trench not applicable



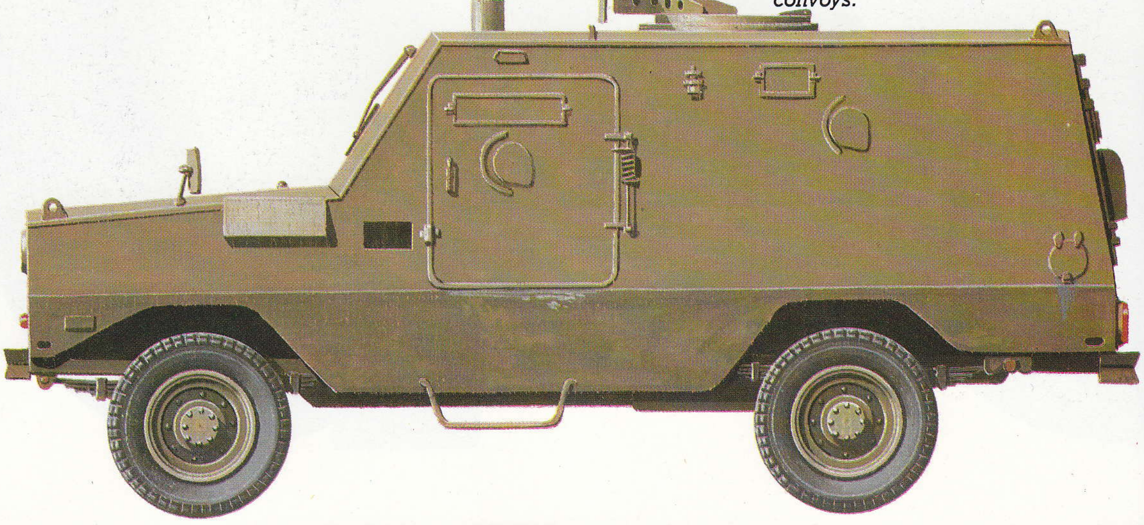
The V-300 has been developed as a private venture by Cadillac Gage. Heaviest of the wide range of weapons operable is the Cockerill Mk III 90-mm gun, mounted in a Cadillac Gage two-man turret. For air defence a 7.62-mm machine-gun is pintle mounted.

USA

Cadillac Gage Commando Ranger armoured personnel carrier

The US Air Force has hundreds of vast bases spread all over the world, and in recent years these have become possible targets for terrorists and other fringe groups as these bases not only contain highly expensive aircraft and/or missiles but also radars and other surveillance devices, fuels and all types of ordnance ranging from ammunition and conventional aircraft bombs up to nuclear warheads. To protect these assets the US Air Force issued a requirement for a vehicle which it called a Security Police Armored Response/Convoy Truck which, in addition to carrying out patrols on air bases, would also escort convoys carrying ordnance to and

Developed to meet USAF base security requirements, the Ranger is also tasked with escorting ordnance convoys.



from bases, or even from the storage dump on the airfield to the aircraft itself.

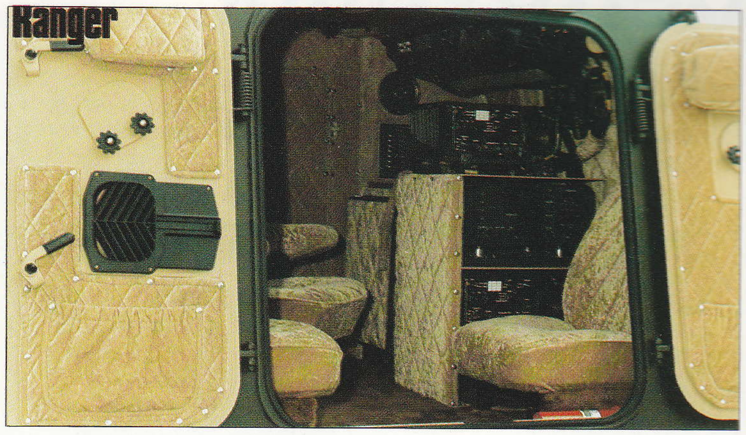
After studying a number of proposals, in early 1979 the US Air Force selected the **Cadillac Gage Commando Ranger** armoured personnel carrier to meet its requirements. The first of these was handed over in the following year, and by 1984 some 700 had been delivered. The US Air Force calls the vehicle the **Peacekeeper**, and sales have also been made by the company to Luxembourg (these are the only armoured vehicles operated by this country) and more recently some have been sold to Indonesia together with a number of Cadillac Gage Commando Scout 4×4 reconnaissance vehicles.

The Commander Ranger is based on a standard Chrysler truck chassis suitably modified and with a shorter wheelbase. (The wheelbase of a vehicle is the distance between the first and last axles.) The full armoured body provides the crew with protection from small arms fire and shell splinters. The engine is at the front of the vehicle and coupled to an automatic transmission with three forward and one reverse gear and a two-speed transfer case. Steering is integral with pump assistance, and suspension front and rear consists of leaf springs and double-acting hydraulic shock absorbers.

The commander and driver are seated to the rear of the engine, each being provided with a bulletproof window to his front and a rearward-opening side door that has a bulletproof vision block and a firing port underneath; in addition there is a firing port between the driver's and commander's windscreens.

The six men sit three down each side in the rear, and enter via two doors in the hull rear. Each of these doors has a firing port, and the left one also has a vision block. In each side of the troop compartment is a vision block and a firing port. In the roof is a hatch on which a variety of light armament installations can be fitted, including a simple shield with a 7.62-mm (0.3-in) machine-gun or a turret with twin 7.62-mm (0.3-in) machine-guns.

Standard equipment includes internal lighting, an air-conditioning system, a heater, two-speed wipers and a windscreen defogger. Optional equipment includes 24-volt electrics in place of the normal 12-volt system, and a winch. Specialized versions include a command vehicle and an ambulance.



The Ranger interior is insulated and air-conditioned, lessening crew fatigue considerably. The interior can be fitted for command and communication equipment or for two crew and six passengers.

Specification

Commando Ranger
Crew: 2+6
Combat weight: 4536 kg (10,000 lb)
Powerplant: one Dodge 360 CID V-8 petrol engine developing 180 hp (134 kW)
Dimensions: length 4.699 m (15 ft 5 in); width 2.019 m (6 ft 7.5 in); height 1.981 m (6 ft 6 in)
Performance: maximum road speed 112.5 km/h (70 mph); maximum range 556 km (345 miles); fording 0.457 m (1 ft 6 in); gradient 60 per cent; vertical obstacle 0.254 m (10 in); trench not applicable

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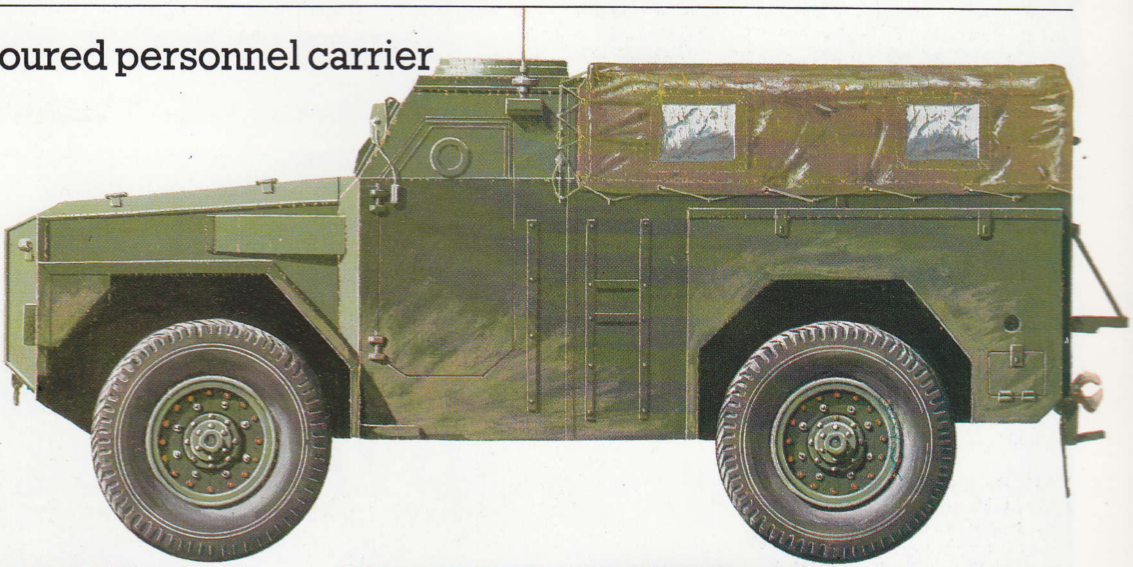
UK

Humber 'Pig' armoured personnel carrier

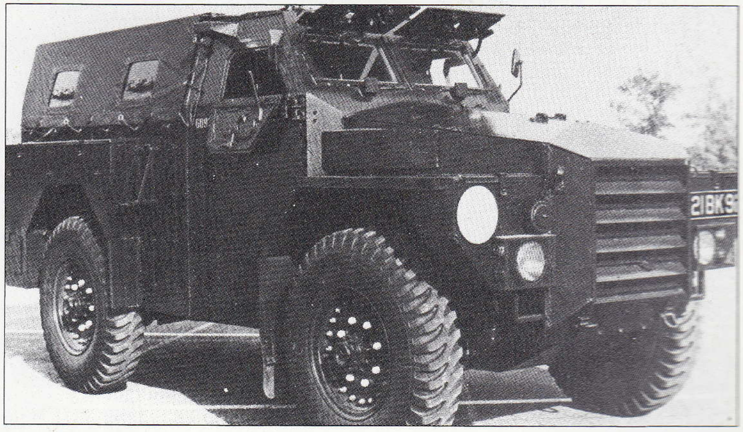
When World War II was over, the British army drew up its requirements for a complete new generation of wheeled military vehicles including a 1-ton truck which was eventually produced by Humber/Rootes. In the early 1950s the Alvis Saracen 6×6 armoured personnel carrier started to enter service, but as there would clearly be insufficient of these to go around it was decided to build an armoured personnel carrier on the **Humber FV1600** series truck chassis. This armoured personnel carrier was not designed to operate with tanks, but rather to transport the infantry from one part of the battlefield to another, where they would dismount and fight on foot. About 1,700 vehicles were eventually built, the bodies being provided by GKN Sankey and the Royal Ordnance Factory at Woolwich. By the 1960s the FV432, also designed and built by GKN Sankey, was entering service in increasing numbers so the **Humber 'Pigs'** were phased out of service and placed in reserve or scrapped. The flare-up in Northern Ireland in the late 1960s meant that many of these vehicles were returned to service, and in 1984 these remain in use with the British army in Northern Ireland.

Many of the Pigs in Northern Ireland have now been specially modified for use in the internal security role, being fitted with additional armour protection to stop 7.62-mm (0.3-in) armour-piercing rounds and barricade-removal equipment at the front of the hull.

The basic armoured personnel carrier model is the **FV1611**, and normally carries six or eight men in the rear with the commander and driver sitting at the front to the rear of the engine. Both the commander and driver are provided with a door in the side, and there are twin doors in the rear. A total of six firing ports/observation blocks are provided in the rear troop compartment, (two in each side and one in each of the rear doors). The ambulance member of the family is the **FV1613**, which has a two-man crew and can carry three stretcher or eight seated patients, and the radio vehicle is the **FV1612.** The anti-tank version was called the **Hornet/Malkara**, or **FV1620**, and had two Malkara long range anti-tank guided missiles in the ready-to-launch position. This model is no longer in service with the British Army.



Above: The FV1609 model of the Humber one-ton armoured personnel carrier entered service in the early 1950s. With an open top, capacity was two crew and up to eight troops.



The 'Pig', as it has come to be known, had been withdrawn from service but heightening civil disorder in Northern Ireland required its return. Some 500 are still in use in the internal security role in Ulster.

Specification

FV1611 'Pig'
Crew: 2+6 (or 2+8)
Combat weight: 5790 kg (12,765 lb)
Powerplant: one Rolls-Royce B60 Mk 5A 6-cylinder petrol engine developing 120 bhp (89 kW)
Dimensions: length 4.926 m (16 ft 2 in); width 2.044 m (6 ft 8.5 in); height 2.12 m (6 ft 11.5 in)
Performance: maximum road speed 64 km/h (40 mph); maximum range 402 km (250 miles); trench not applicable

Derry Patrol

Since 1969 the British Army's involvement in Northern Ireland has become an established fact. To the authorities, the problems of a divided Ireland seem insoluble, but to the soldier on the ground Ulster consists of large portions of routine-inspired boredom and a life under a constant blanket of tension.

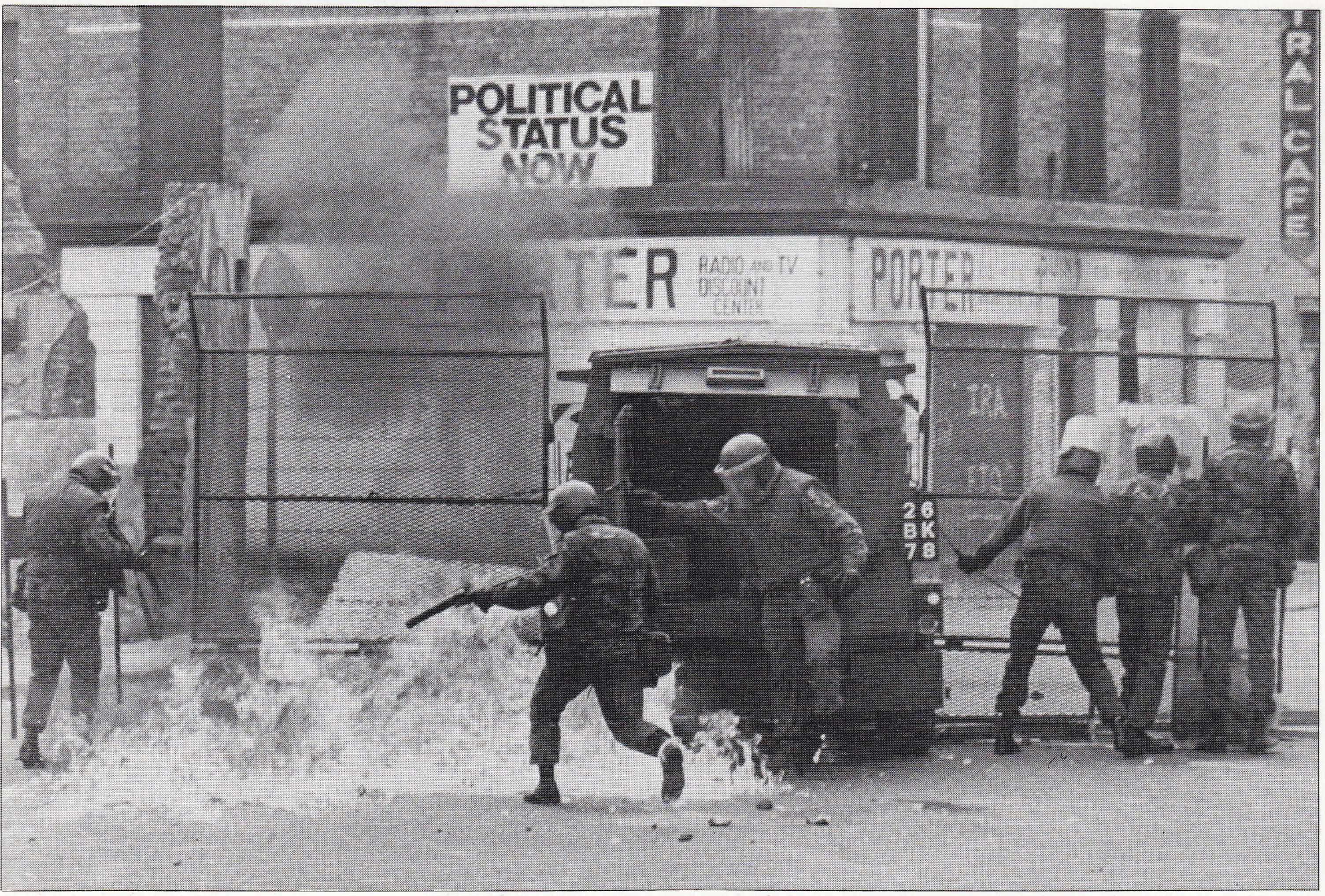
The patrol started, as all such patrols seemed to start, with a short and informal parade in the back of the one-time police station in which the battalion was headquartered during what was its fourth Operation 'Banner' tour. Many of the soldiers on the three-vehicle patrol had seen and heard it all before during previous tours, but they had learned that among all the routine that was provided there was always some detail that had to be noted and new personnel and things to watch for. As it ended the usual routine of synchronizing watches and double-checking radio frequencies went along the usual smooth lines, and all was ready.

The parade broke up into the three main groups and as the men left for the vehicles out in the yard every weapon was checked to see that it was loaded and that the correct number of CS and smoke grenades were being carried by each man. In the yard the strange 'caged' atmosphere imposed by the high anti-mortar bomb wire mesh fences seemed to affect every man. Each instinctively looked up to the sky as he went through the door of the building, and had a swift look around as he moved to the vehicles.

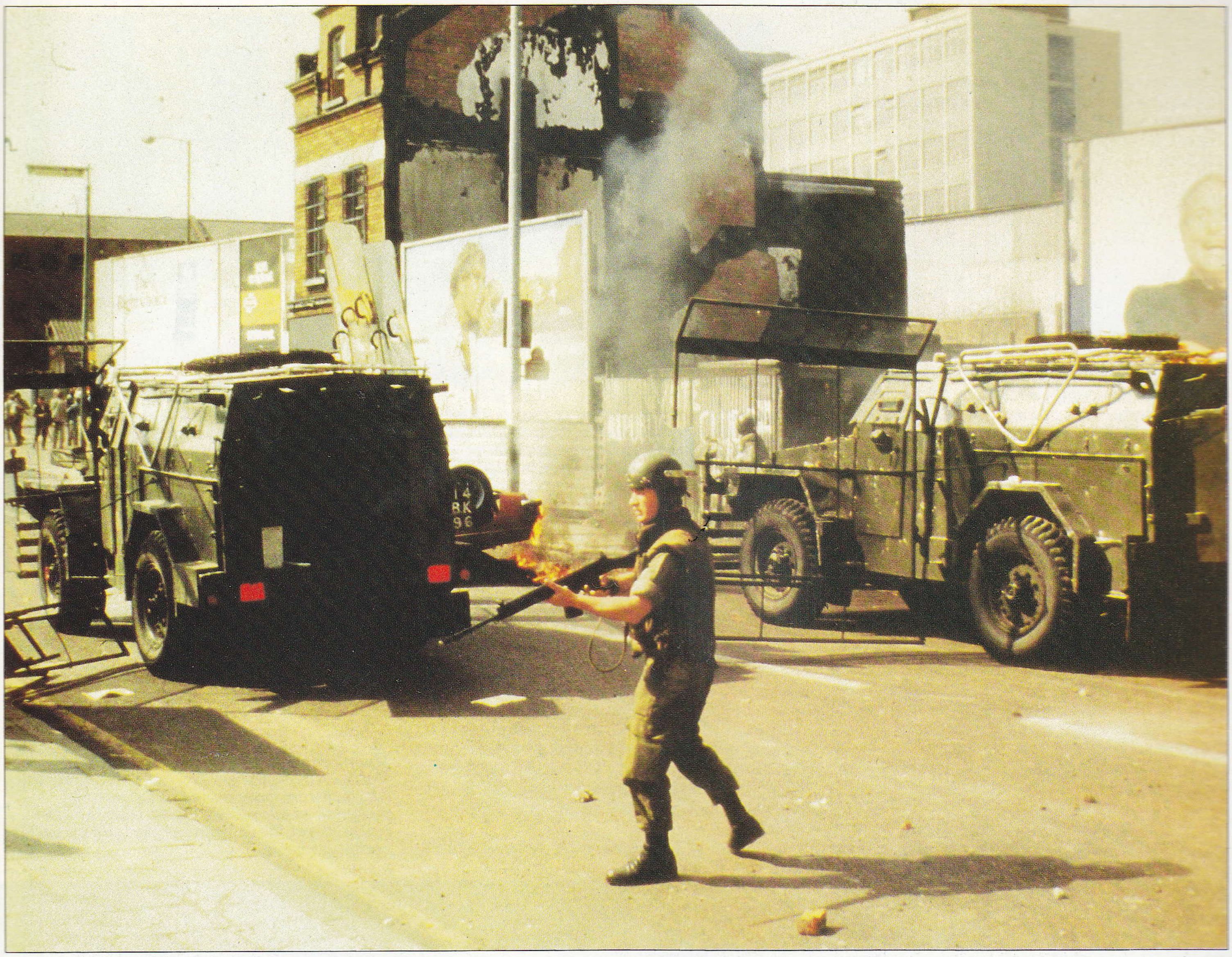
The three vehicles were a single Pig and two Land Rovers. The largest party of eight men moved into the Pig and strapped themselves in. Everyone was familiar with the old Pigs, which to the untrained spectator always looked odd with their large barricade ram on the front and the mesh screens along the sides to give some protection from bombs. Closer scrutiny would have revealed the heavy doors and the thick slabs of extra armour, proof against high-velocity bullets, but to the soldiers it was all old hat as they arranged themselves in the high seats in the back, their heads in the restraining headrests that would probably save their necks if the Pig was turned over by a mine.

The smaller groups of five men went to the two Land Rovers. At first sight they seemed to be normal Land Rovers apart from the hard tops but, again, closer scrutiny revealed changes from the norm. For a start the hard tops really were hard, for they were made of special armour, part of a kit purposely produced for the Land Rovers in their internal role in Northern Ireland. There was more armour under the vehicle to protect the occupants against the effects of mines and/or bombs thrown into the road, and all door and window seals were at least partially protected to prevent the petrol from improvised petrol bombs getting into the interior. All the windows were reinforced with extra glass panels and all were covered with wire mesh screens to avoid the worst effects of the juvenile stone-throwers who always seemed to be around, even during school term time. Each Land Rover also had one feature that was so commonplace to the soldiers that they hardly noticed its presence. This was a high steel post fixed to the side of the driver's cab, although some carried this item on the front bumper. At the top of this post was a curved and sharp edge whose function was to catch and cut any wire that might be strung up across a street between two lamp-posts. In the early days of the Troubles some youths had learned that such wires were invisible to any vehicle occupant who might be poking his head out of a roof hatch. Some nasty injuries had been inflicted by this simple means and the steel post was now a standard fixture on every army vehicle.

One of the Land Rovers had an odd bump in



May 1981, and the funeral of a hunger striker has passed. Williams Street, Derry is tense, and the inevitable strain spills over into violence. An army patrol is attacked with petrol bombs, and the monotony of patrolling has suddenly become a very desirable existence.



the roof. Its purpose was revealed inside for the bump was a Claribel aerial. Claribel had been developed especially for use in Northern Ireland, and was a special radar that could detect the flight of an incoming bullet or rocket and indicate the direction from which it came. Normally all that the soldiers inside the vehicle would hear would be the sound of the shot and have no means of telling from what direction it might have come. The introduction of Claribel, a small and simple device, had led to some spectacular arrests of snipers who had thought that they had got away after their shot, and thus Claribel was one of the soldiers' best friends.

When everyone was aboard, the huge steel gates of the yard slid open and the patrol began. The headquarters was not far from the wreckage of the old Bogside together with all the slum dwellings and their hate-filled graffiti, so the immediate vicinity was an unpleasant place to be, even on a normal peaceful day. With the patrol out things were even more unpleasant. Most passers-by did not give them a second look, but as soon as the vehicles moved out two or three children immediately ran off into the maze of streets off the main road to warn that the patrol was out. The old practice of banging dustbin lids on the approach of a patrol had largely died out but now and again it still happened.

Every soldier on the patrol wore a 'flak jacket', a bulky and restricting garment but something that might save him from injury if a home-made nail bomb was thrown at him. The jacket might even stop a bullet under certain circumstances and at least one soldier in the Pig owed his life to his flak jacket, although he suffered a badly bruised rib cage for weeks afterwards. Each man had his steel helmet handy but these were being replaced by a new riot helmet with a perspex visor that could be closed down over the face for extra protection against stones. Each man, including the single officer leading the patrol, carried the standard L1A1 7.62-mm (0.3-in) rifle fitted with a SUIT sight for more accurate shooting under low light conditions, and one man in each vehicle carried a riot gun for firing baton rounds at selected troublemakers in a crowd.

On the road

As always, everyone was keyed up. Even the most experienced Northern Ireland hands could feel the tension as the three vehicles moved along rain-soaked streets towards their foot patrol start point. Patrols could not be conducted from vehicles alone, so the soldiers had to de-bus at some preselected point and make a sweep through run-down streets and past small shops to examine tatty garages and derelict buildings. This procedure had been perfected as a drill. As each man left the shelter of the vehicle he raised his rifle to one shoulder and scanned the immediate neighbourhood; the next man faced the opposite way and so on. Once the patrol was formed up in an open file each man knew that there was always someone in the patrol watching his back and radio communications with the headquarters was always maintained.

The citizens of Londonderry, or Derry as they preferred to call their city, were well used to the sight of armed soldiers striding through their midst and some gave the young soldiers no attention. Some with reasons of their own for not liking the sight of the patrol on their doorsteps stood and stared with open hostility, but the young children showed no fear and came very often to try and talk with the patrol as it moved past. The soldiers gave them what time they could but never for one minute dropped

The explosion of a booby-trapped car adds its quota of wreckage to troubled Ulster streets. An army patrol approaches cautiously, as such events have all too often become the bait in a trap for unwary security forces.

their constant observation of their surroundings, for at any time a sniper might open up, kids or no kids. The very atmosphere in some streets was hostile, but in others the soldiers moved on through completely apathetic householders. But it was always noticeable that the older kids kept well away and stood watching silently.

It was a quiet patrol, and after about an hour of moving cautiously through the soft rain and through the remains of what had once been a busy and heavily populated district the patrol once more came upon its three vehicles waiting at the end of the street with the drivers already in their seats and with their 'shotgun' guards holding their rifles at the high port and ready for instant action. This time the boarding procedure went through the well-rehearsed drill with no problems, and the soldiers settled down into their usual routine of mickey-taking among themselves as they tried to make themselves comfortable despite being tightly strapped into their seats while their clothing was soaking wet from the rain.

As the patrol moved through its last stages the soldiers could see little of the outside world. The Land Rover had no side vision ports and the Pig had only small ports through which a riot gun or rifle could be shoved for aiming. Sometimes the rear occupants could keep the door open for extra vision or some fresh air but this patrol had been in Derry too long to want to see much more of the surroundings. The men were all too familiar with the place and its hostility and, like all soldiers everywhere, all they wanted was for their stint to end. A tour of 4½ months was quite enough for them as their training started well before they had to leave their comfortable quarters in a quiet West German town. Once they got back there would be a spell of welcome leave to enjoy, and then it would be back to the normal BAOR training that was their real job.

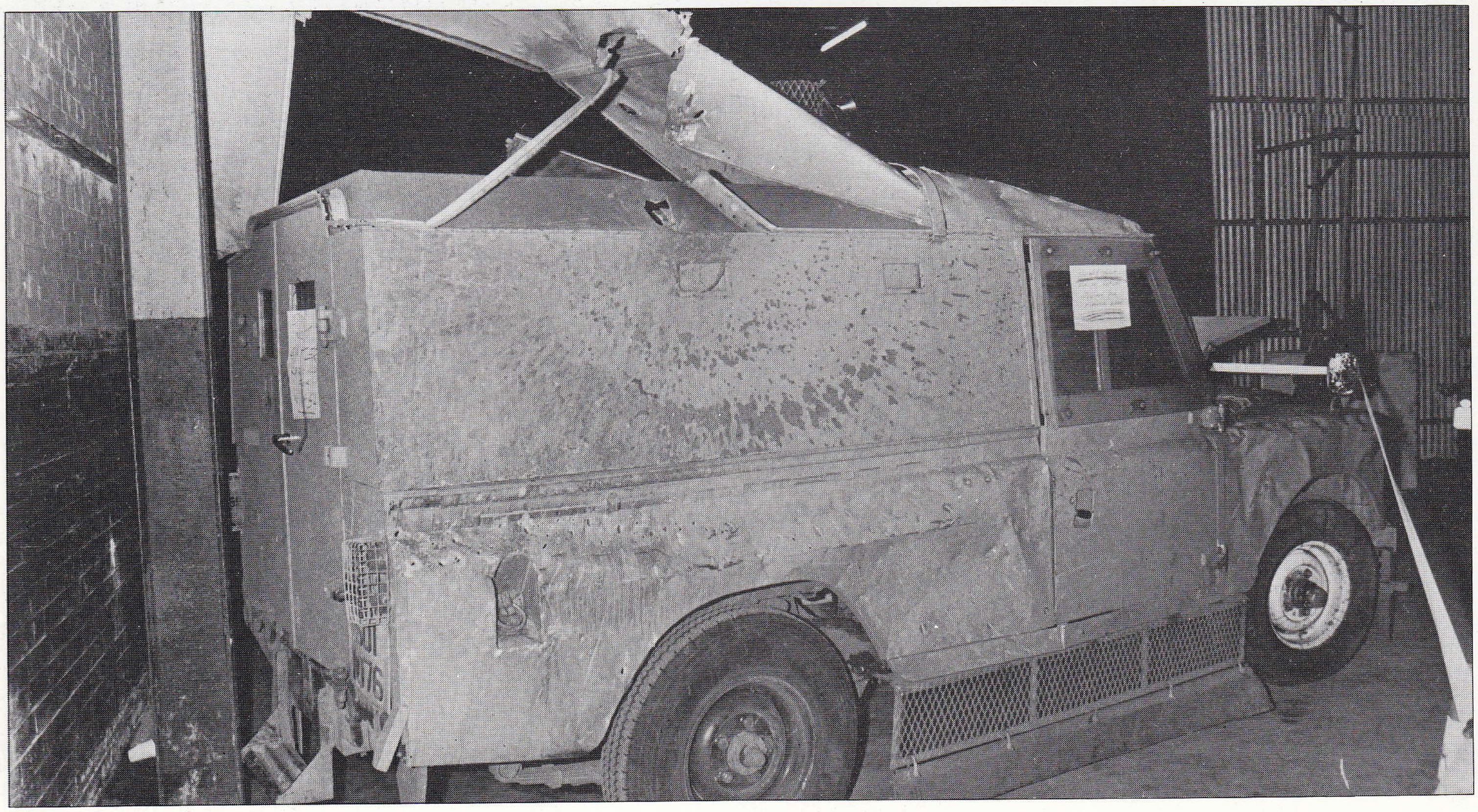
Saracen armoured personnel carriers in Ulster early in 1971. The first years of the troubles saw soldiers in conventional helmets, with visors added later. Modern helmets have been purpose-designed.

So the doors remained closed until the vehicles were once more back in the headquarters yard. It had been a typical patrol in Derry. Tension had been there throughout and was hardly relaxed until the soldiers were once more in the room where they started some hours before. But before that they all had to go through one of the more important parts of the whole patrol and that was the clearing of their rifles. Each soldier had to remove the magazine from his rifle and work the bolt several times to clear any round that might be still in the chamber. Too many accidents had been caused by soldiers neglecting this simple procedure as they started to relax once their patrol ended.

With the rifles cleared the tension still remained, although at a much lower level, for while the patrol had been completely uneventful, as most of them were to a brain-bending degree, there was always the next one that could produce the unseen bullet or the sudden explosion that might cause injury or death. This could not be forgotten as the patrol did their individual best to grab a cup of tea and something to eat after a quick clean-up. Then it would be time for a rest on bunks crammed into crowded rooms that had once been prisoners' cells.

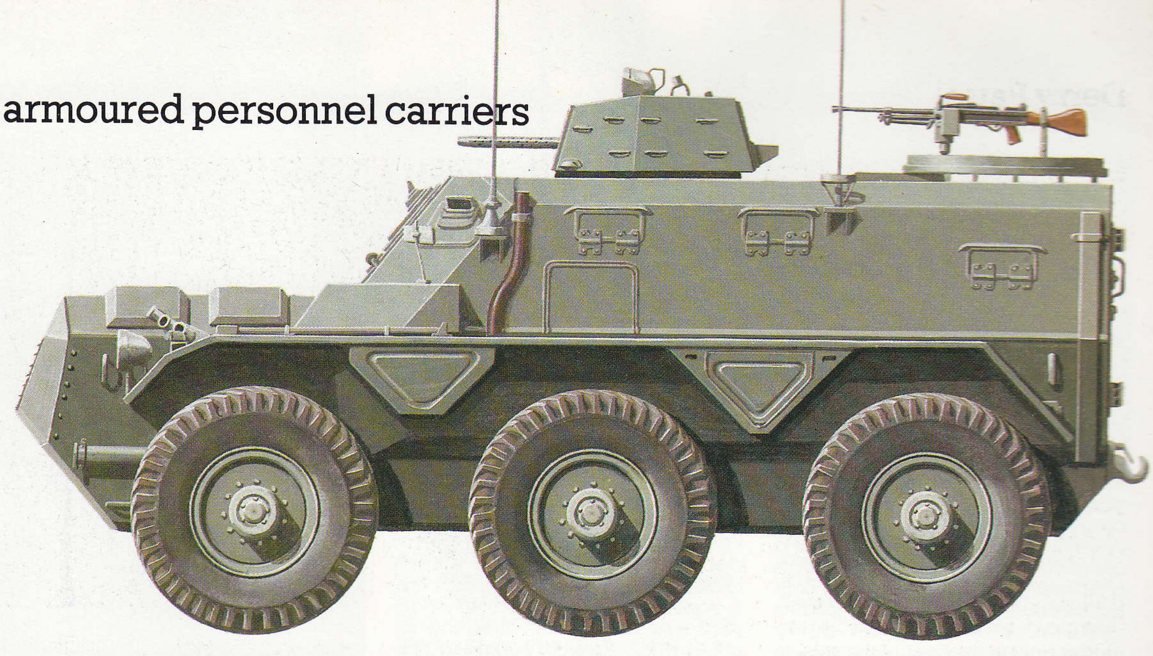
Outside the vehicles were already refuelled and ready for the next patrol, for the routine never ended. As one patrol finished, another started.

Many armoured Land Rovers are in use in Northern Ireland. They are, however, vulnerable to attack from more sophisticated terrorist weapons, as this vehicle shows. Hit by a Soviet-made rocket, the driver was killed and his partner seriously injured.



UK

Alvis Saracen armoured personnel carriers



First produced in 1952, the FV 603 Saracen APC was a member of a family of 6×6 vehicles. The turret mounts a 0.30-calibre machine-gun.

After the end of World War II the Fighting Vehicles Research and Development Establishment (FVRDE) designed in the UK a complete family of wheeled armoured vehicles known as the **FV600** series which included the FV601 Saladin armoured car and the **FV603 Saracen** armoured personnel carrier. The requirement for the latter was much more urgent because of the guerrillas being encountered in Malaya, so development of this version took precedence, and the first prototypes were completed in early 1952, production vehicles following by December of the same year. Production of the whole FV600 series was undertaken by Alvis Limited at Coventry, and 1,838 vehicles had been completed by the time production came to an end in 1972. Throughout the 1950s the Saracen was the only real armoured personnel carrier in service with the British army, used in the Far East and Middle East (for example Aden and Libya) as well as in the United Kingdom and with the British Army of the Rhine. From the early 1960s replacement of the Saracen in the BAOR started by the FV432 full-tracked armoured personnel carrier, which has better cross-country performance, improved armour protection and longer operational range. In 1984 the Saracen remained in service with the British army in Northern Ireland, where it is used in internal security operations, with the Territorial Army and in Hong Kong. Sales of the Saracen were also made to Indonesia, Jordan, Kuwait, Lebanon, Libya, Nigeria, Qatar, South Africa, Sudan, Thailand, the United Arab Emirates and Uganda.

Although the FV603 Saracen had the same automotive components as the FV601 Saladin 6×6 armoured car, its layout was quite different with the engine at the front and troop compartment at the rear. The driver is seated in the centre, with the section commander to his left rear and radio operator to his right rear. To their rear are the eight infantrymen, who are seated on individual seats (four down each side of the hull facing inwards). The troops enter and leave via twin doors in the hull rear, and firing ports are provided in the sides and rear. On the forward part of the roof is a manually-operated turret with a 7.62-mm (0.3-in) machine-gun (this turret is identical with that fitted to some Ferret scout cars), and over the rear part of the troop compartment is a 7.62-mm (0.3-in) Bren light-machine gun for air defence.

Steering is hydraulically assisted on the front four wheels, and the vehicle can be driven with one wheel missing from each side. Some vehicles supplied to the Middle East were not fitted with a roof.

There were not many variants of the Saracen as the **FV602** ambulance was cancelled fairly early on in the development programme. The **FV604** is a command vehicle, while the **FV610** is also a command vehicle with a much higher roof to allow the command staff to work standing up. The **FV611** is an ambulance model and also has a higher roof. The FV610 was also fitted with the Robert surveillance radar but this never entered service; the same fate befell the 25-pdr self-propelled gun version and a roller-type mine-clearing vehicle.

Specification

Saracen

Crew: 2+10

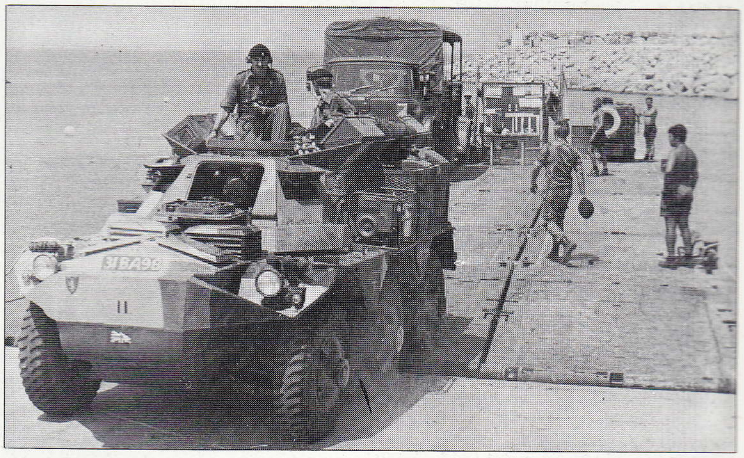
Combat weight: 8640 kg (19,048 lb)

Powerplant: one Rolls-Royce B80 Mk 6A 8-cylinder petrol engine developing 160 hp (119 kW)

Dimensions: length 5.233 m (17 ft 2 in); width 2.539 m (8 ft 4 in); height (overall) 2.463 m (8 ft 1 in)

Performance: maximum road speed 72 km/h (44.7 mph); maximum road range 400 km (248 miles); fording 1.07 m (3 ft 6 in); gradient 42 per cent; vertical obstacle 0.46 m (1 ft 6 in); trench 1.52 m (5 ft 0 in)

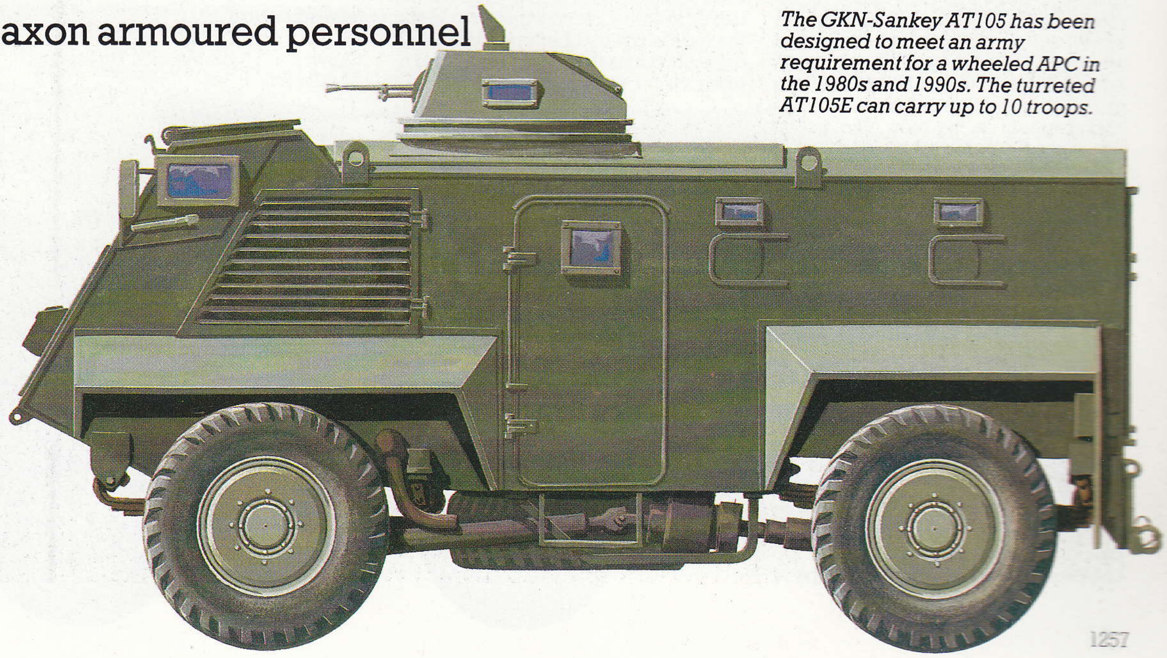
Versions of the Saracen include the FV 604 command vehicle, seen landing from a Mexefloat while on exercise with the 13/18 Hussars in Cyprus. Notice the extensive external stowage, the auxiliary generator on the front wing and the lack of the machine-gun turret.



UK

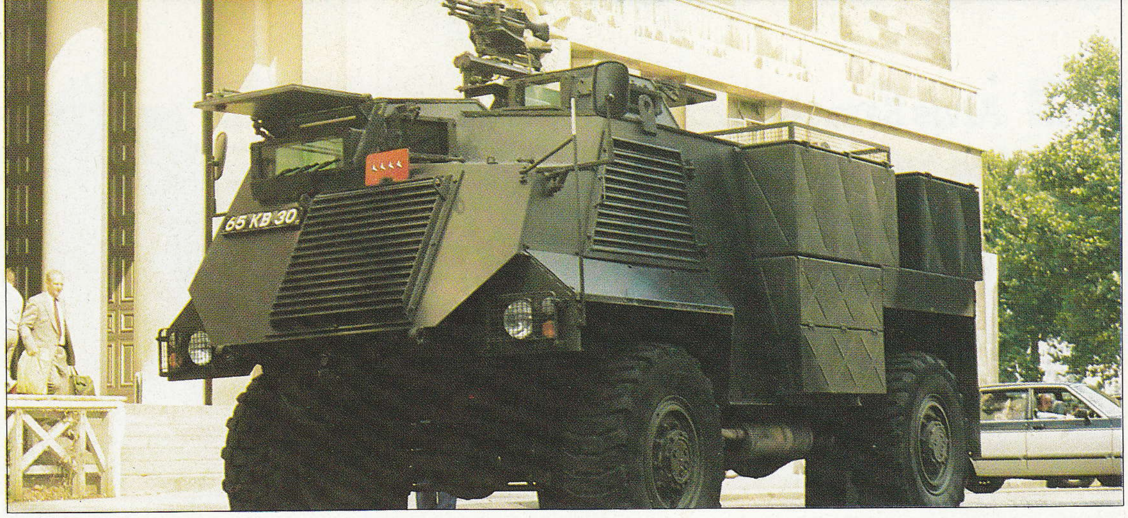
GKN Sankey Saxon armoured personnel carrier

The GKN-Sankey AT105 has been designed to meet an army requirement for a wheeled APC in the 1980s and 1990s. The turreted AT105E can carry up to 10 troops.



In the early 1970s GKN Sankey built the **AT100** 4×2 and **AT104** 4×4 vehicles as a private venture, these being aimed mainly at the internal security role. The former never entered production, but about 30 AT104s were built for the Dutch state police and Royal Brunei Malay Regiment. These were followed by the **GKN Sankey AT105** which was subsequently called the **Saxon**. This is a completely new design and uses many common automotive components from the Bedford MK 4×4 4-tonne truck, which is the standard vehicle in its class in the British army and many other armed forces around the world. Production of the AT105 started by 1976, and by 1984 about 200 had been sold to Bahrain, Kuwait, Malaysia and Oman. The British army purchased three for evaluation purposes in the 1970s, and in 1983

GKN Sankey Saxon (continued)



The AT105P, seen outside the UK Ministry of Defence, has a commander's cupola with pintle-mounted 7.62-mm GPMG. The cupola can be removed and replaced by one of a number of alternative armament installations.

placed an order for 50 further vehicles. The first of these were delivered early in 1984 and are issued to infantry battalions in the United Kingdom who, in time of war, will be sent to West Germany to reinforce the British Army of the Rhine (BAOR). At present these battalions use standard Bedford MK 4×4 trucks for this purpose. The British army requirement is for up to 1,000 AT105s, and these may also be issued to Territorial battalions as well as Regular battalions.

The AT105 Saxon has a hull of all-welded steel construction that provides complete protection against small arms fire and shell splinters, including 7.62-mm (0.3-in) armour-piercing rounds; indeed the vehicle is one of the best armoured vehicles of its type available in the world today. Both left-hand and right-hand drive models are available, the driver being seated right at the front of the vehicle with the engine to his left or right. The troop compartment is at the rear of the hull, and twin doors are provided in the hull rear and a single door in each side to allow for the rapid exit of troops. British army vehicles do not have the left door installed as external bins are fitted for the stowage of personnel kit and supplies. The commander's cupola in the roof of the Saxon is fixed and fitted with an observation block in each of the four sides for all-round observation; a 7.62-mm (0.3-in) machine-gun is mounted on a DISA mount for ground and anti-aircraft fire. A wide range of other armament installations can be fitted, including turret-mounted 7.62-mm (0.3-in) and 12.7-mm (0.5-in) machine-guns or anti-riot weapons. If required firing ports and/or vision blocks can be installed in the troop compartment. An unusual feature of the Saxon is that its mudguards are of light sheet steel construction which will blow off in the event of the vehicle hitting a mine so that the blast is not contained under the hull.

Variants of the Saxon proposed by the manufacturer include a command vehicle, a mortar carrier, an armoured ambulance and various anti-riot versions, including one with an obstacle-clearing blade at the front of the hull.

GKN Sankey has also designed the **Simba** range of armoured vehicles which can be used as armoured personnel carriers or as weapon carriers with a wide range of armament installations up to 90 mm (3.54 in) in calibre.

Specification

Saxon
Crew: 2×8
Combat weight: 10670 kg (23,523 lb)
Powerplant: one Bedford 500 6-cylinder diesel developing 164 bhp (122 kW)
Dimensions: length 5.169 m (16 ft 11.5 in); width 2.489 m (8 ft 2 in); height 2.86 m (9 ft 4.6 in)
Performance: maximum road speed 96 km/h (60 mph); maximum range 510 km (317 miles); fording 1.12 m (3 ft 8 in); gradient 60 per cent; vertical obstacle 0.41 m (1 ft 4 in); trench not applicable

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BRAZIL

ENGESA EE-11 Urutu armoured personnel carrier

In 1970 the Brazilian company ENGESA, which had for some years been successfully converting 6×4 and 4×2 trucks into 6×6 and 4×4 models for increased cross-country mobility, turned its attention to the development of a range of 6×6 wheeled vehicles to meet the requirements of the Brazilian armed forces. In 1970 prototypes of the ENGESA EE-9 Cascavel armoured car and **ENGESA EE-11 Urutu** armoured personnel carrier made their first appearance. Production of these started in 1974 at a new plant at Sao Jose dos Campos, and by early 1984 some 3,000 EE-9s and EE-11s had been built, most of them for export, especially to the Middle East.

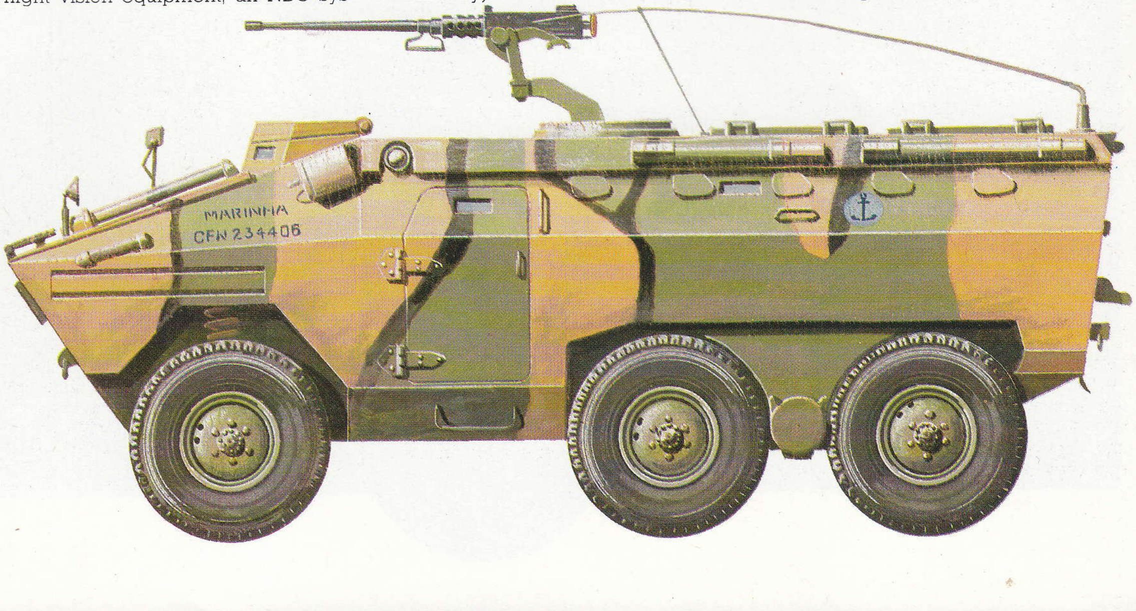
The layout of both vehicles is quite different although they both share many common automotive components such as engine, transmission and suspension. In the EE-11 the driver is seated at the front on the left side with the engine to his right and the troop compartment to his rear. The troops can enter the vehicle via a door in the side of the hull or through two doors in the hull rear. Over the top of the troop compartment are four roof hatches, two on each side, which open outwards, while forward of this is the main armament installation. This can range from a pintle- or ring-mounted 12.7-mm (0.5-in) M2 HB machine-gun, via a turret armed with a 20-mm cannon and a co-axial 7.62-mm (0.3-in) machine-gun, right up to a two-man turret armed with a 90-mm (3.54-in) gun, 7.62-mm (0.3-in) co-axial and 7.62-mm (0.3-in) anti-aircraft machine-gun. This turret is similar to that fitted to the EE-9 armoured car, but has no bustle and the 90-mm (3.54-in) gun has a reduced recoil length. Firing ports and/or vision blocks can be installed in the troop compartment to enable the troops to fire their weapons from within the vehicle if required. The infantry sit on seats down each side of the hull facing each other, and these seats can be folded up to allow cargo to be carried. The EE-11 is fully amphibious, being propelled in the water at a speed of 8 km/h (5 mph) by two propellers at the hull rear. Before the vehicle enters the water a trim vane is erected at the front of the hull by the driver, who does so without leaving his seat, and the electric bilge pumps are switched on. The **EE-11 Mk 2** is available with a Detroit Diesel or a Mercedes-Benz diesel engine coupled to an automatic transmission, although the original **EE-11 Mk 1** had a manual transmission. All models now have a central tyre pressure regulation system that enables the driver to adjust the tyre pressure to suit the type of ground being crossed, and optional equipment includes a winch, night vision equipment, an NBC system and various radio installations.

A whole range of versions of the basic vehicle has now been designed by the company, including ambulance, cargo, command, recovery, anti-tank and anti-aircraft vehicles. The anti-tank model has MILAN or HOT ATGWs, while the anti-aircraft has a French ESD turret with twin 20-mm cannon and a surveillance radar. When fitted with the two-man 90-mm (3.54-in) turret the EE-11 is known as the **Urutu Armoured Fire Support Vehicle** (AFSV), and this is known to be used by Tunisia. The recovery vehicle has a hydraulically-operated crane for changing components in the field, and a winch for recovering other vehicles.

Specification

EE-11
Crew: 2+12 (commander, driver and 12 infantry)
Combat weight: 13000 kg (28,660 lb)
Powerplant: one Detroit Diesel 6V-53N 6-cylinder diesel developing 212 hp (158 kW)
Dimensions: length 6.15 m (20 ft 2 in); width 2.59 m (8 ft 6 in); height (without armament) 2.09 m (6 ft 10.3 in)
Performance: maximum road speed 90 km/h (56 mph); maximum road range 850 km (528 miles); fording amphibious; gradient 60 per cent; vertical obstacle 0.6 m (1 ft 11.6 in); trench not applicable

The ENGESA EE-11 Urutu armoured personnel carrier has a crew of two and can carry up to 12 fully armed infantrymen. Basic armament is a 12.7-mm (0.50-in) M2 HB heavy machine-gun.

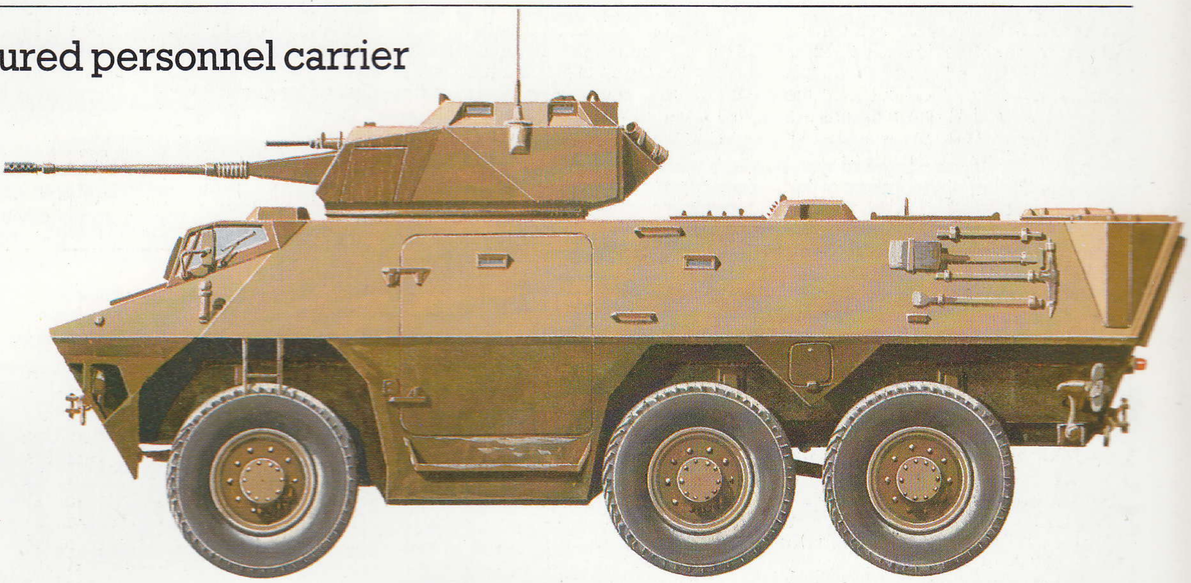


Left: The EE-11, in production since 1974 has been successful in the export market. This version is equipped with a Swedish-designed Hagglunds turret armed with a 20-mm cannon from Hispano. A 7.62-mm machine-gun can also be fitted.

Above: The 3,000 or more Urutus manufactured have carried a wide variety of weapon systems. This model is equipped with a Euromissile MILAN ATGW system and a 7.62-mm M1919 machine-gun.

BELGIUM

SIBMAS armoured personnel carrier



The SIBMAS 6×6 APC was designed as a private venture. It can be armed with the French SAMM TTB 120 20-mm two-man turret.

In the mid-1970s the Belgian company B N Constructions Ferroviaires et Métalliques started development, as a private venture, of a 6×6 armoured personnel carrier which would have a number of common and proven commercial components. The first **SIBMAS** prototype was completed in 1976, the second following in 1979. One of these was tested by the Royal Malaysian army in competition with a number of vehicles submitted from other European, North American and South American companies. In the end Malaysia selected two vehicles to meet its requirements, namely the Condor 4×4 from Thyssen Henschel of West Germany and the Belgian SIBMAS 6×6. The order for the latter, valued at about £50 million, was placed in 1981, and the first vehicles were delivered in 1983. Two versions have been ordered by Malaysia: 24 examples of the **SIBMAS Armoured Recovery Vehicle (ARV)** and 162 examples of the **SIBMAS Armoured Fire Support Vehicle 90 (AFSV-90)**. The latter has a two-man turret designed and built by Cockerill and armed with a 90-mm (3.54-mm) Cockerill Mk III gun, 7.62-mm (0.3-in) co-axial and 7.62-mm (0.3-in) anti-aircraft machine-gun, and fitted with an OIP fire-control system.

The hull of the SIBMAS is of all-welded steel construction which provides the crew with complete protection from small arms fire and shell splinters. The driver is seated at the front of the vehicle, with the crew compartment in the centre and the engine at the rear of the vehicle on the left side, an aisle connecting the troop compartment with a door in the hull rear being fitted on the right side. Doors are provided in each side of the hull, and there are hatches over the troop compartment. Depending on the model, firing ports/and or vision blocks can be fitted in the sides and rear of the troop compartment. The engine is coupled to a fully automatic ZF transmission with six forward and one reverse gear and a hydrodynamic torque converter. Steering is power-assisted on the front wheels, and if required the vehicle can be fitted with a hydraulically-operated winch to assist in self-recovery or in the recovery of other vehicles.

The basic model is fully amphibious without preparation, being propelled in the water by its wheels at a speed of 4 km/h (2.4 mph). The SIBMAS can also be fitted with two propellers at the hull rear to provide a maximum water speed of 11 km/h (6.8 mph). Other optional equipment includes night vision equipment, an air-conditioning system, a heater and an NBC system.

Other armament installations can also be fitted including the French ESD turret with twin 20-mm anti-aircraft cannon and a surveillance radar, the Lynx 90 turret with a 90-mm (3.54-in) gun, the Serval 60/20 turret, and a wide range of light armament installations such as twin 7.62-mm (0.3-in) machine-guns. The main armament installation is normally mounted to the rear of the driver's position, and a 7.62-mm (0.3-in) machine-gun can be mounted over the aisle at the right rear of the vehicle. More specialized versions of the SIBMAS include ambulance, command and cargo vehicles.

Specification
SIBMAS

Crew: 3+11

Combat weight: 14500 kg to 16500 kg (31,967 to 36,376 lb) depending on role and armament

Powerplant: one MAN 6-cylinder turbocharged diesel developing 320 hp (239 kW)

Dimensions: length 7.32 m (24 ft 0 in); width 2.50 m (8 ft 2.4 in); height (hull) 2.24 m (7 ft 4.2 in)

Performance: maximum road speed 100 km/h (62 mph); maximum road range 1000 km (621 miles); fording amphibious; gradient 70 per cent; vertical obstacle 0.6 m (1 ft 11.6 in); trench 1.5 m (4 ft 11 in)

The major export success to date for the SIBMAS has been the 186 vehicle sold to Malaysia. Most of the vehicles have been the Cockerill Mk III armed AFSV-90 version, for use as Armoured Fire Support Vehicles.

UK/BELGIUM

BDX/Valkyr armoured personnel carrier

In the early 1970s Technology Investments of Ireland designed and built the prototype of a 4×4 armoured personnel carried called the **Timoney**, and after trials with several prototype vehicles the Irish army finally ordered 10 vehicles in two batches of five. In 1976 Beherman Demoen of Belgium obtained a licence from Technology Investments to manufacture the Timoney armoured personnel carrier in Belgium. The Belgian government placed an order for a total of 123 vehicles under the designation **BDX**, and these were all built between 1978 and 1981. Of the 123, 43 were delivered to the Belgian air force for the defence of air bases, while the remainder were supplied to the Gendarmerie. All of the air force vehicles have a 7.62-mm (0.3-in) machine-gun, while the Gendarmerie vehicles comprise 13 fitted with an 81-mm mortar, 41 in the armoured personnel carrier role and the remaining 26 fitted with a front-mounted dozer blade.

The BDX was also tested in a number of other countries including Malaysia, but the only order obtained was placed by Argentina, which ordered five vehicles for use in the internal security role.

More recently Vickers Defence Systems of the United Kingdom have undertaken further development of the BDX which has resulted in the **Valkyr**, whose first two prototypes were completed in 1982 and the third in 1984. The Valkyr has many significant improvements over the original vehicle and is considered by many to be a new vehicle. It is powered by a proven General Motors Model 4-53T diesel coupled to a fully automatic AT-545 transmission with four forward and one reverse gear. Two basic models of the Valkyr are being offered, an armoured personnel carrier and a weapons platform which has a slightly lower profile and has already been experimentally fitted with a variety of weapons stations including a French turret armed with a 90-mm (3.54-in) gun and the Belgian CM-90 Cockerill turret armed with the 90-mm (3.54-in) Cockerill Mk III gun, 7.62-mm (0.3-in) co-axial and 7.62-mm (0.3-in) anti-aircraft machine-guns.

When used as an armoured personnel carrier the vehicle normally has a two-man crew consisting of the commander/machine-gunner and driver, and can carry 10 fully equipped troops, who can rapidly leave the vehicle via twin doors in the hull rear. If required the Valkyr can be fitted with firing ports and/or vision blocks and a wide range of options including air-conditioning, riot-control equipment and night vision devices. It is fully amphibious, being propelled in the water by its wheels, although as an option waterjets can be fitted to provide a much higher water speed.

In addition to armoured personnel carrier and fire-support vehicle models, a wide range of other variants are possible such as forward ambulance, command post vehicle, mortar carrier, and anti-tank vehicle fitted with turret mounted ATGWs.

Specification

BDX

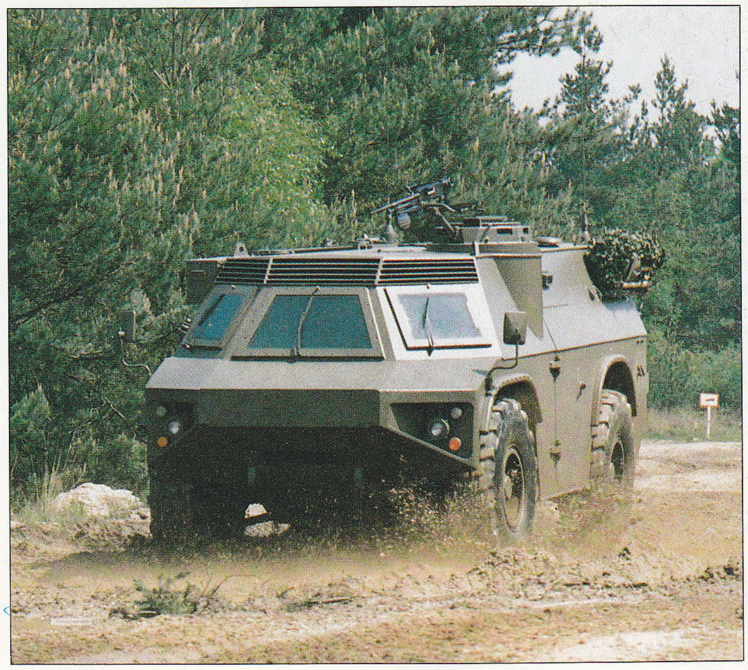
Crew: 2+10

Combat weight: 10700 kg (23,590 lb)

Powerplant: one Chrysler V-8 water-cooled petrol engine developing 180 hp (134 kW)

Dimensions: length 5.05 m (16 ft 7 in); width 2.50 m (8 ft 2.4 in); height (hull top) 2.06 m (6 ft 9 in)

Performance: maximum road speed 100 km/h (62 mph); maximum range (road) 500 to 900 km (310 to 560 miles); fording amphibious; gradient 60 per cent; vertical obstacle 0.4 m (1 ft 4 in); trench not applicable



The Vickers Valkyr, while based upon the Timoney/BDX design, is of significantly improved capability. As has become the norm with modern APCs, the Valkyr can be fitted with a wide range of weapon systems.

ITALY

Tipo 6614 armoured personnel carrier

Some years ago Fiat and OTO-Melara designed and built prototypes of a 4×4 armoured car (the Tipo 6616) and a 4×4 armoured personnel carrier (**Tipo 6614**), both of which had identical automotive components although their layouts were quite different. Many of the automotive components of these vehicles are taken from standard commercial vehicles to keep costs to a minimum as well as making spare parts easier to obtain on a worldwide basis. The Tipo 6616 is used in small numbers by the Italian police, and known export customers include Libya, Peru, Somalia and Tunisia. It is estimated that about 400 vehicles at least had been built by 1984, and licence production is also undertaken in the Republic of Korea by Asia Motors Incorporated, who call the vehicle the **KM900**.

The hull of the Tipo 6614 armoured personnel carrier is of all-welded steel construction that varies in thickness from 6 mm (0.24 in) to 8 mm (0.315 in), and this provides protection against 7.62-mm (0.3-in) small arms fire and light artillery splinters. The driver is seated at the very front of the vehicle on the left side with the engine to his right. The troop compartment is toward the rear, and the 10 fully equipped troops, including the commander, sit on individual bucket type seats that can be quickly folded up. The troops enter and leave via a door in each side of the hull, or over a power-operated ramp in the hull rear. A total of 10 firing ports is provided, with a vision block above each; four of these ports are in each side of the hull (including one in the door) and one on each side of the rear ramp. Over the top of the troop compartment is a two-part roof hatch that opens to each side, while to the front of this is the main armament installation. This is normally an M113-type cupola with a single-piece hatch cover that opens to the rear, periscopes for all-round observations and a 12.7-mm (0.5-in) M2 HB machine-gun. A turret armed with twin 7.62-mm (0.3-in) machine-guns can also be installed. One of the more unusual versions offered has a multiple rocket launcher, this consisting of an Italian 48-round 51-mm system which can be fired by remote control at a rate of 10 rounds per second. Other variants include a mortar carrier which is known to be used by Peru, an ambulance and a command vehicle.

The Fiat engine is coupled to a manual gearbox with five forward and one reverse gear and a two-speed transfer case. The Tipo 6614 is fully amphibious, being propelled in the water by its wheels at a speed of 4.5 km/h (2.8 mph), and before the vehicle enters the water the four electrically-operated bilge pumps are switched on to pump out any water that enters the vehicle through the door or ramp seals. As usual a range of optional equipment is available apart from the different weapon stations, these including various types of passive night vision equipment, a spare wheel and holder (often mounted on the roof of the troop compartment), smoke dischargers, an air-conditioning system, a fire extinguishing system, and a front-mounted winch with a capacity of 4500 kg (9,221 lb) and 40 m (131 ft) of cable. This last would be used to recover other vehicles or to assist in self-recovery.

Specification

Tipo 6614

Crew: 1+10

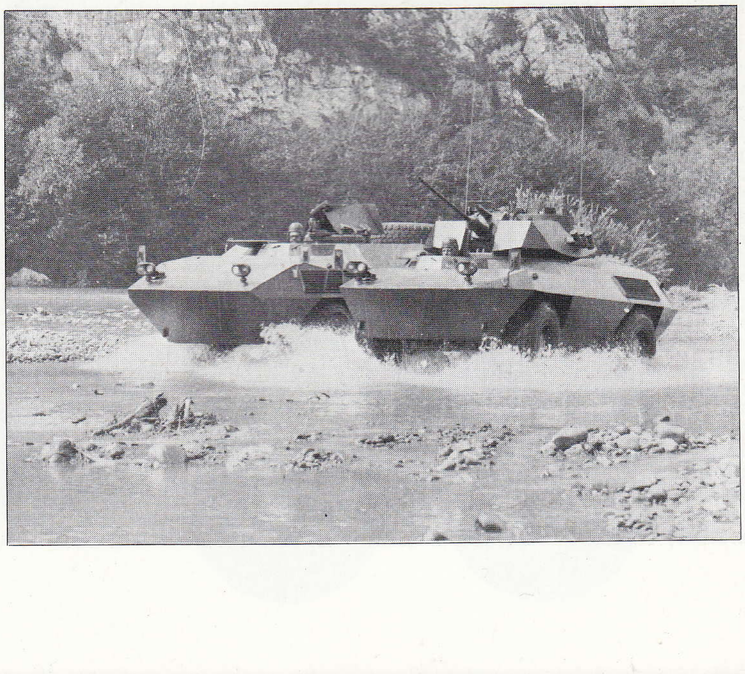
Combat weight: 8500 kg (18,739 lb)

Powerplant: one Model 8062.24 supercharged liquid-cooled diesel developing 160 hp (119 kW)

Dimensions: length 5.86 m (19 ft 2.7 in); width 2.50 m (8 ft 2.4 in); height (hull top) 1.78 m (5 ft 10 in)

Performance: maximum road speed 100 km/h (62 mph); maximum range 700 km (435 miles); fording amphibious; gradient 60 per cent; vertical obstacle 0.4 m (1 ft 4 in); trench not applicable

Seen fording a stream, the Type 6614 APC (left) shares many components with the Type 6616 armoured car. The APC can transport 10 men in addition to the driver, with usual armament being a 12.7-mm MG.



US Army

Part 3

Infantry weapons

The basic service rifle of the US Army is the 5.56-mm M16A1. Most have been produced by Colt, though some have been manufactured as far away as South Korea, and the type is now virtually a standard rifle worldwide. As a result of recent NATO ammunition trials the current 5.56-mm cartridge is due to be replaced by the Belgian SS109 cartridge which requires a different rifling pitch, so existing M16A1s will have to be replaced or modified. Already an M16A2 version is on the stocks. At first, the M16 had teething troubles and acquired a reputation for jamming, but these are now history. The 5.56-mm round is said by some not to be a particularly powerful 'man-stopper', but it is easy to handle and produces low recoil.

The 5.56-mm (0.223-in) cartridge is also used for the Squad Automatic Weapon (SAW), chosen as the fire-support weapon for the infantry squad. Soon to enter service, the SAW is a development of the Belgian FN Minimi light machine-gun, a compact weapon with ammunition feed from a side-mounted box magazine.

M14 rifles in 7.62-mm×51 NATO calibre are still found in some National Guard units. The M14 is a modernized version of the M1 Garand of World War II. Its modified sniper version, the M21, is still in front-line service with specialized personnel.

The standard US Army machine-gun is still the 7.62-mm (0.3-in) M60, used in the light and heavy machine-gun roles on a bipod or tripod respectively. There are numerous sub-variants of the M60, some mounted on helicopters and vehicles. The basic weapon is a belt-fed machine-gun with an air-cooled barrel. There are features of the M60 which have not stood up too well in service, but the type will remain standard for years to come.

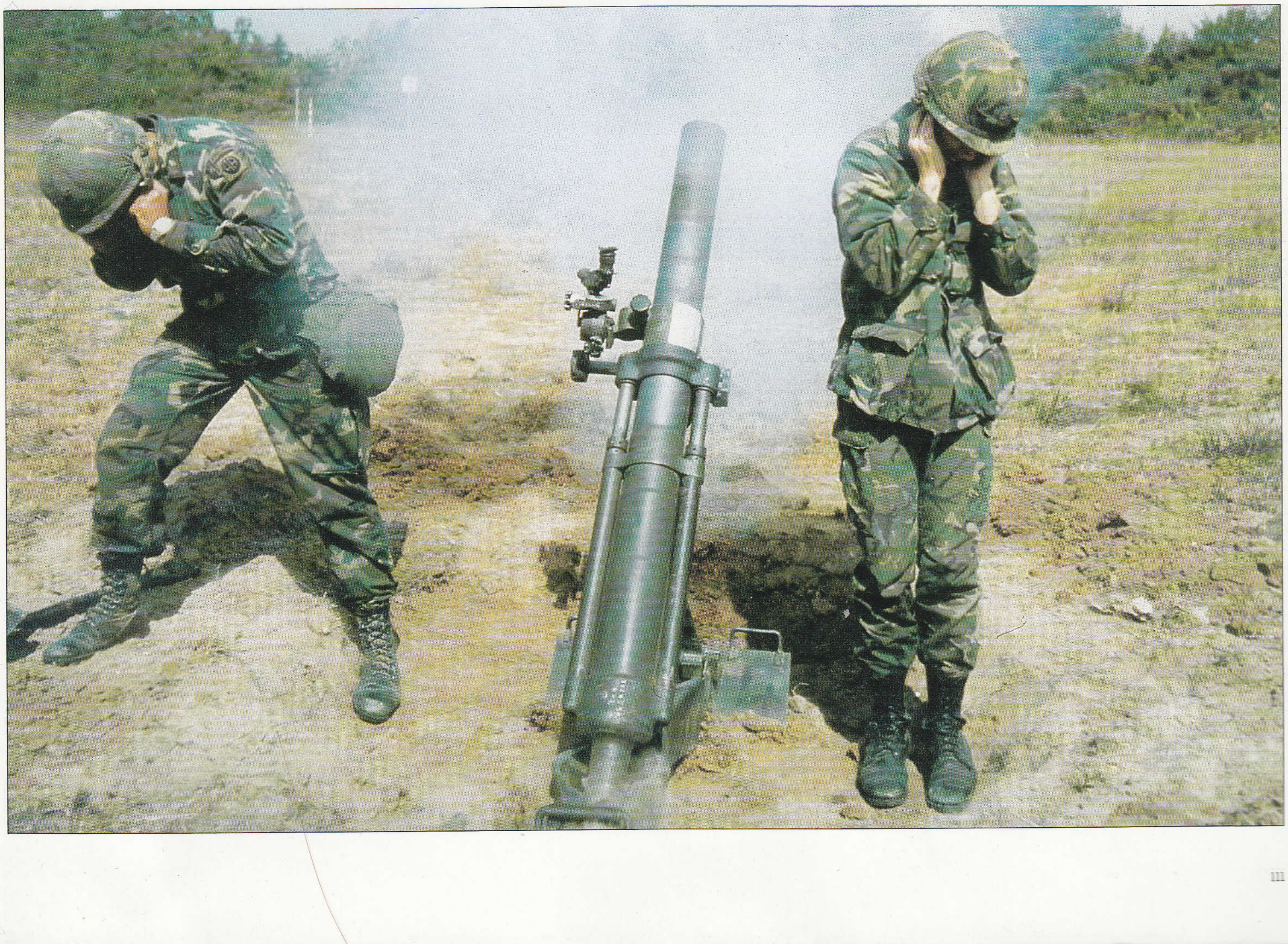
Perhaps the most famous of American machine-guns is the 12.7-mm (0.5-in) Browning HB (Heavy Barrel) M2 machine-gun. This superlative weapon has been in inventory for decades and is still in production. The main reason for its longevity is quite simply reliability and a round that remains among the best of available anti-personnel weapons. The power of the ammunition is such that it can be used against almost any vehicle except a tank, and special armour-piercing ammunition is produced. The M2 can be mounted on a tripod, and also on vehicles and light river craft.

The US Army's array of grenades ranges from the basic M68 hand grenade to the complex family of 40-mm projected grenades. These latter grenades can be fired from the shotgun-like M79 grenade-launcher or the M203 device mounted beneath the barrel of the M16A1 rifle. The weapon is accurate as far as 400 m (440 yds), making these launchers very useful squad weapons indeed. There is now a move to procure automatic launchers for the 40-mm grenade under the designation M19.

To lob projectiles to greater ranges, the US Army uses mortars. The smallest is the 60-mm M224 Lightweight Company Mortar, a new weapon that can throw a 1.5-kg (3.3-lb) HE bomb about 4575 m (5,000 yds). The M224 will replace the heavier 81-mm M29 mortar but a new generation 81-mm mortar is also being sought. The new weapon may well be the British L16, but the latter's delayed trials programme and political difficulties may mean that the M29 and its later M29A1 variant will have to soldier on for some time to come. A point of interest is that American soldiers refer to their mortars as 'cannons'.

Though not primarily an infantry weapon, the largest mortar used by the US Army is the 107-mm (4.2-in) M30, a modernized version of the World War II weapon with the same bore diameter. This differs from others of its kind by firing a spin-stabilized projectile from a rifled barrel, other mortars firing a fin-stabilized bomb from a smooth-bore barrel. The M30 can fire a 10-kg (22-lb) HE bomb to a range of 6800 m (7,435 yds), and is so heavy that it is usually carried in a special version of the M113 armoured personnel carrier.

The infantry is well supplied with anti-tank weapons, but trials are under way to select a more powerful, portable anti-tank weapon to cope with



A 4.2-in mortar the moment after it has been fired. These mortars are normally carried and fired from an M106 carrier, which carries the crew and 88 mortar bombs. Under development is a terminally guided 4.2-in mortar, which will home on to enemy tanks and attack their tops.

the coming generation of main battle tanks, which will have thicker armour. Current weapons include the M47 Dragon medium anti-tank weapon, a heavy missile-launcher requiring a muzzle-mounted bipod to allow the operator to aim and fire accurately. The Dragon missile is wire-guided and aimed by a tracker unit mounted on the launcher tube. Range is about 1000 m (1,095 yds), now seen as insufficient, although the Dragon will remain in service for some time. Inflight corrections are transmitted to the missile along the guidance wires, and corrections are made by firing tiny rocket jets arranged in rows along the missile body, the jets 'kicking' the missile toward its intended path.

The smaller 66-mm M72 family of rocket-launchers carries its rocket in a telescopic tube, the tube being unopened until required for use. Sighting the M72 is simple, and once the weapon has been fired the tube is discarded. The M72's main problem is that its warhead is now too small for the tank targets it is likely to encounter. Attempts have already been made to replace the M72. One project, the Viper, an updated variant of the M72, has been proposed but found wanting. The British LAW 80 is one candidate in the current US Army trials.

Still held in reserve and used by the National Guard, but unlikely to be employed again in anger, are the 106-mm (4.17-in) recoilless rifle, often carried on a Jeep, and the 89-mm (3.5-in) bazooka.

Most powerful and best known of infantry-based anti-tank weapons is the TOW heavy anti-tank weapon system. Although not normally carried by soldiers, TOW (Tube-launched, Optically-tracked, Wire-guided) is the most important US Army anti-tank weapon and is currently undergoing a programme to improve the missile's armour-piercing capabilities. The new variant is the I-TOW (Improved TOW) which is said to be capable of piercing the frontal armour of the latest types of Soviet tank. In its basic form TOW is fired from a tube-launcher mounted on a tripod. A tracker unit on the launcher is used to keep the sight cross-hairs on the tank target, and once fired the TOW missile is automatically guided by signals sent along the guidance wires. The high-speed TOW missile has a range of 3750 m (4,100 yds). It can be mounted on vehicles and is extensively used from helicopters.

Anti-aircraft defence for the infantry is provided partially by the Browning M2 heavy machine-gun on a special mounting or from vehicle pintles, but also by special anti-aircraft missiles. One in-service infantry system is the FIM-43 Redeye, a basic shoulder-launched system firing an infra-red seeking weapon. Although effective, Redeye has severe operational limitations, some of which have been carried over to its intended replacement, the FIM-92 Stinger. The main problem with both is that they tend to 'chase' after an aircraft target, the main source of infra-red emissions being the aircraft's exhaust. This can mean that a fighter-bomber is engaged only after it has passed and dropped its ordnance. The other drawback to both is cost. Each missile costs thousands of dollars. The US Army is currently conducting tests to find a 'fire-and-forget' anti-aircraft missile system suitable for infantry use.

Men of the 82nd Airborne Division during the invasion of Grenada late in 1983. The leading trooper is armed with a 7.62-mm M60 GPMG to provide fire support for the other troops armed with standard 5.56 mm M16 rifles. The M60 is used in a variety of other applications.

Troopers of the 2/7th United States Cavalry on a Search and Destroy mission in Vietnam in 1968. They are armed with the Colt 5.56-mm M16 rifle, which initially gave a lot of trouble due to incorrect maintenance, but these problems were eventually solved.

An infantry squad can carry several of the M72A2 light anti-tank weapon, as it weighs only 2.36 kg (5.2 lb). Its M18 warhead can penetrate 305 mm (12 in) of armour, and it can also be used to good effect against enemy infantry, as was demonstrated in Vietnam.